Journal of Diabetes and Endocrinology Vol. 2(4), pp. 41-52, 15 December, 2011
Available online at http://www.academicjournals.org/JDE
ISSN 2141-2685 ©2010 Academic Journals

Full Length Research

Prevalence of overweight and obesity, and status of chronic non- communicable diseases and some related risk factors among Egyptian adolescents

Nebal Abdel Rahman Aboul Ella*, Dina Ibrahim Shehab and Mervat Ahmad Ismail

National Nutrition Institute, Cairo, Egypt.

Accepted 25 July, 2011

Obesity is a major threat to children's health today. The prevalence of obesity has been steadily increasing; over the past 25 years, the number of obese children has nearly tripled and is more likely to have risk factors for cardiovascular disease, such as type 2 diabetes high cholesterol or high blood pressure. Research objectives were to study the current prevalence of overweight and obesity among adolescents in Egypt from 2000 to 2008, to estimate the prevalence of glucose disorders, hypertension, lipid profile, and metabolic syndrome, and to investigate some related risk factors among 10 to 18 years old school adolescents. For assessing prevalence rates of overweight and obesity among adolescents, data from reports of other cross-sectional studies carried out by National Nutrition Institute (NNI) (2000 to 2005) and Egypt Demographic and Health Survey (2008) were compared. To estimate the prevalence of glucose disorders, hypertension, lipid profile, and metabolic syndrome, a randomized stratified cluster-sample of preparatory and secondary school students was used. Body mass index (BMI) was calculated and referred to corresponding international reference values for age and sex. A fasting blood sample was drawn to assess lipid profile and fasting plasma insulin. Overweight and obesity are prevalent among Egyptian adolescents of both sexes, and at least, for girls, the prevalence has increased in the last few years. Pre-diabetic state was present among 16.4% of adolescents. The crude prevalence of hypertension is 1.4%. The overall proportion of adolescents with high total cholesterol is 6.0%; the proportion with high lower density lipoprotein (LDL)-cholesterol is 7.5%, with high triglycerides of 8.2%, and low higher density lipoprotein (HDL) cholesterol of 9.4%. We conclude that overweight and obesity, type 2 diabetes mellitus (T2DM), hypertension and cardiovascular risk factors in young are serious in terms of morbidity and mortality, suggesting that they are an appropriate target for screening.

Key words: Prevalence, overweight and obesity, chronic non- communicable diseases, Egyptian adolescents.

INTRODUCTION

The world is witnessing a worsening global obesity epidemic with levels rising at alarming rates in low-and-middle income countries (LMIC). The Middle East and North Africa region has the highest rates of overweight and obesity of the developing world with implications for the global disease burden and local health service capacity (Amina et al., 2009). Obesity is epidemic among all ages of children and is global in scope. The World Health Organization (WHO) estimated that 43 million children are overweight and obese even in their preschool years, and 35 million of these children are in developing countries (de Onis et al., 2010). Modern lifestyles (inactivity, passive overeating and/or sociocultural/economic influences) in an obesogenic environment cause an increased prevalence of obesity among children (Kruger et al., 2006). Childhood/adolescent obesity is associated with health problems for the child/adolescent including heightened risk of psychosocial morbidity, cardiovascular complications, and type 1 and 2 diabetes. Of further concern is the fact that obese children and adolescents are likely to be obese adults at increased risk of cardiovascular diseases and other morbidity, premature death, and impaired social,

*Corresponding author. E-mail: neballl@yahoo.com.

educational and economic productivity (Elizabeth et al., 2010). Recent World Health Organization (2005) report, preventing chronic diseases: A vital investment, showed that non-communicable diseases (NCDs) dominated by diabetes are causing double the deaths that are caused by infectious diseases, maternal / perinatal conditions, and malnutrition combined. The report states that without action, 388 million people globally will die from chronic diseases like diabetes and heart disease in the next decade. The most important risk factors for chronic diseases are high blood pressure, high concentration of cholesterol, inadequate intake of fruits and vegetables, overweight and obesity, physical inactivity and tobacco use. Five of these risk factors are closely related to physical activity and diet. Taken together, the major risk factors account for around 80% of deaths from heart disease and stroke (WHO, 2010). The aim of this work is to study the current prevalence of overweight and obesity among adolescents in Egypt from 2000 to 2008, to estimate the prevalence of glucose disorders, hypertension, Lipid profile, metabolic syndrome and to investigate some related risk factors among 10 to 18 years old school adolescents.

MATERIALS AND METHODS

Ethical approval was obtained from the research ethics committee of the General Organization for Teaching Hospitals and Institutes. For assessing prevalence rates of overweight and obesity among adolescents, data from reports of other cross-sectional studies carried out by National Nutrition Institute (NNI) (2000 to 2005) and Egypt Demographic and Health Survey (EDHS) (2008) were compared. The status of chronic non–communicable diseases was assessed using a random stratified cluster sample of preparatory and secondary school students (4251 students) through the school year 2004 to 2006 that was recruited by teams of NNI. Seven governorates were randomly chosen (Giza, Aswan, Sohag and El-Menia from upper Egypt and Ghariba, Kaliobia, and Kafr El-Shikh from lower Egypt). Ethical approval was obtained from the research ethics committee of the General Organization for Teaching Hospitals and Institutes. Studied adolescents were subjected to the following:

1. Medical assessments including family history of chronic non-communicable diseases, pattern of physical activity and symptoms covering various systems, general examination including blood pressure measurements.

i. Anthropometric assessment (Quetelet, 1830 to 1850); anthropometric measurements were carried out according to Jelliffe (1966); weight, height and waist circumference were measured and BMI was calculated according to the following formula (Quetelet, 1830 to 1850):

BMI = weight (kg)/height (m)^2

weight: participant was weighed wearing light cloths and without shoes, using beam balance to the nearest 0.1 kg; height: was measured with the subject's head in the Frankfort plane and without shoes to the nearest 0.1 cm; waist circumference: just above the pelvic bony (prominences) landmarks.

2. Assessment of BMI for adolescents from 10 to 18 years old was done using categories reported by national center for health statistics (NCHS) in collaboration with national center for chronic disease prevention and health promotion (CDC, 2000); underweight < 5th percentile, normal weight 5th to < 85th percentile, overweight 85th to < 95th percentile and obese ≥ 95th percentile. Assessment of waist circumference for adolescents from 10 to 18 years old was done using categories reported by Fernandez et al. (2004); wasted < 10th percentile, normal 10th to < 75th percentile, at risk 75th to < 90th percentile and obese ≥ 90th percentile.

3. Fasting blood glucose level was performed using Ascensia Entrust glucometer (Bayer) and glucometerenin.

4. Fasting blood sample was drawn to assess: i) total cholesterol (TC) using an enzymatic method with cholesterol esterase and cholesterol oxidase (Allain et al., 1974); ii) triglycerides (TG) were measured using an enzymatic method with glycerol phosphate oxidase (Dryer, 1970); iii) HDL-cholesterol was measured after precipitation of apo-B containing lipoproteins with magnesium chloride / dextran reagent using the same enzymatic method (Finley, 1978); iv) LDL-cholesterol was calculated in plasma samples using Friedwald formula: LDL-Cholesterol = total cholesterol – (HDL-Ch + triglyceride/ (Friedwald, 1972); v) fasting plasma Insulin levels by ELISA procedure (Temple, 1995).

5. For metabolic syndrome definition among adolescents, definition developed by United State National Cholesterol Education program with modified cutoff values for children and adolescents (NCEP, 2001, 2004) were used according to Lambert et al. (2004). It includes abnormalities in any three of the following components: presence of overweight (BMI ≥ 85 percentiles) or at risk for central obesity (waist circumference ≥ 75 percentiles, elevated systolic or diastolic BPs (≥90 percentiles (NHBPEP, 2004), low HDL-cholesterol levels (<40 mg/dl), high fasting serum triglyceride levels (>110 mg/dl), high fasting serum glucose levels (>110 mg/dl) (NCEP, 1993)

Statistical methods

Data analysis was carried out using SPSS package Version 13. Qualitative data were summarized as percentages and comparison between groups was done using chi square and t-test for proportions. Odds ratio (OR) was used to estimate the attributable risk (AR), attributable risk percent (AR %), and population attributable risk percent (PAR %) of obesity.

RESULTS

Table 1 reveals demographic data as adolescents aged 10 to 12 years formed nearly one third of the total examined. Middle aged adolescents constituted the majority; nearly 60%, while older adolescents were the least; 15.0%. However, sample size per each age group, per sex, and per area was quite enough to estimate health evidences stated in area of actions. Targets were randomly selected so that each educational level was adequately represented. Table 2 shows percent distribution of adolescents according to educational level distributions and reflected that urban to rural samples were nearly one to one as well as male to female samples, half were in the preparatory educational level and the second half in the secondary one. Table 3 illustrates weight status based on BMI categories through year 2000 to 2008. The prevalence of overweight is nearly twice that of obesity in all studies. Clearly, overweight and obesity (combined percentages) are prevalent among Egyptian adolescents and it is more for female adolescents. Table 4 summarizes health benefits gained from elimination

Table 1. Demographic distribution of the sample according to age, sex, and area of residence.

Age group	Urban	Rural	Total	
			No	Percent
Males				
10-12 yr	428	356	784	26.4
13-15 yr	988	814	1802	60.7
16-18 yr	204	179	383	18.9
Total	1620	1349	2969	49.3
Females				
10-12 yr	399	513	912	29.9
13-15 yr	834	776	1610	52.9
16-18 yr	331	196	527	17.2
Total	1564	1485	3049	50.7
Totals				
10-12 yr	827	869	1696	28.2
13-15 yr	822	1590	3412	56.7
16-18 yr	535	375	910	15.1
Grand total (%)	3184 53.0	2834 47.0	6018	100

DNPCNCD (2005).

Table 2. Percent distribution of adolescents according to educational level.

Educational class	Educational level				Total	
	Preparatory		Secondary			
	Number	Percent	Number	Percent	Number	Percent
First	1124	33.7	1335	49.8	2459	40.9
Second	1227	36.8	816	30.4	2043	33.9
Third	986	29.5	530	19.8	1516	25.2
Total	3337	55.5	2681	44.5	6018	100

Table 3. Prevalence rates of overweight and obesity in adolescents through years (2000 to 2008).

Source and year of survey	location	Sample			Overweight*	Obesity*
		Size	Sex	Age(years)	85 ≥ 95th percentile	≥ 95th percentile
Shaheen and Tawfik, 2000	Cairo, Qualyobia and Behaira	382	Male	10-19	15.2	5.5
		482	Female	10-19	17.9	7.6
Shaheen, Hathout and Tawfik, 2004	National	2 702	Male	12-19	10.6	5.8
		3 488	Female	12-19	19.9	9.7
Hassan et al. 2004	National	2 039	Male	10-19	9.9	4.8
		2 021	Female	10-19	15.7	7.8
Mervat et al. 2005	National	2 969	Male	10-18	11.5	6.5
		3 049	Female	10-18	15.2	7.7
EDHS, 2008	National	9000	Male	10-19	15.0	5.0
		8383	Female	10-19	19.0	6.0

*Body mass index percentiles (NCHS and CDC, 2000).

Table 4. Odd ratio (OR), attributable risk (AR), attributable risk percent (AR %), and population attributable risk percent (PAR %) of obesity and waist.

Parameter	BMI ≥ 95 percentile				Waist ≥90th percentile			
	Odds R[1]	AR[2]	AR %[3]	PAR %[4]	Odds R[1]	AR[2]	AR %[3]	PAR %[4]
T-cholesterol	1.85*	0.049	45.9	16.7	3.17*	125.0	68.5	8.0
Triglycerides	1.98*	0.059	49.5	19.0	2.7*	0.119	63.0	6.5
HDL- cholesterol	1.16	ns	ns	ns	1.66	ns	ns	ns
LDL- cholesterol	1.897*	0.055	47.3	18.0	2.6*	0.111	61.5	5.7

[1]Odds R; it is the ratio of the odds in favor of exposure among the exposed to the odds in favor of exposure among the non-exposed. It is a measure for the strength of association between the occurrence of a health event (e.g. dyslipidemia) and the exposure to a risk factor (e.g. obesity).

*This means that there is a significant excess risk of the disease/ health event among the exposed group.

[2]AR; attributable risk represents the incidence of the event (e.g. dyslipidemia) among the exposed (e.g. obesity) that is attributed to the exposure and can be reduced if exposure is eliminated.

[3] AR % represents the proportion by which the incidence of the event among the exposed group can be reduced if exposure is eliminated.

[4] PAR % represents the proportion by which the incidence of the event among the population can be reduced if exposure is eliminated.

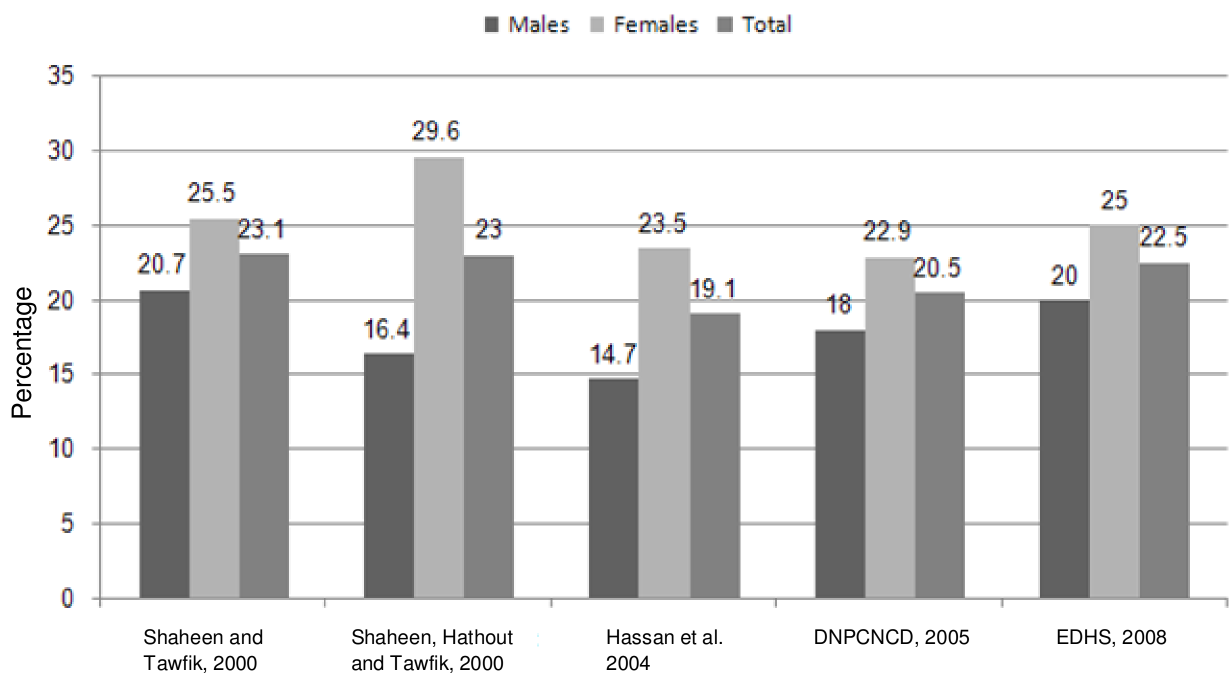

Figure 1. Prevalence rates of overweight / obesity (> 85th) in adolescents through years (2000 to 2008).

of obesity as reflected by having acceptable levels of serum lipid levels. Obese are at nearly double the risk for dyslipidemia compared to non-obese. Those with high waist circumference are even at more risk (nearly triple that of normal). High BMI explains 5 to 6% of amplitude of dyslipidemia among obese while high waist circumference contributes 11 to 12%. The incidence of dyslipidemia among obese can be reduced by nearly 50% if BMI is reduced to normal range and by 62 to 70% if waist is kept normal. The incidence of dyslipidemia among adolescents can be reduced by 17 to 19% if obesity is eliminated and by 6 to 8% if waist circumference is within the accepted range.

Figure 1 illustrates the prevalence rates of overweight/ obesity (> 85th) in adolescents through years 2000 to 2008 and shows that overweight and obesity (combined) are prevalent among Egyptian adolescents of both sexes, and at least for girls the prevalence has increased in the last few years. Figure 2 shows that the prevalence of diabetes mellitus among Egyptian adolescents is 0.7% and the pre-diabetic state was present among 16.4% of adolescents. Figure 3 shows the crude prevalence of dyslipidemia categories among Egyptian adolescents. The overall proportion of adolescents with high total cholesterol is 6.0%; the proportion with high LDL-cholesterol is 7.5%, with high triglycerides 8.2%, and with

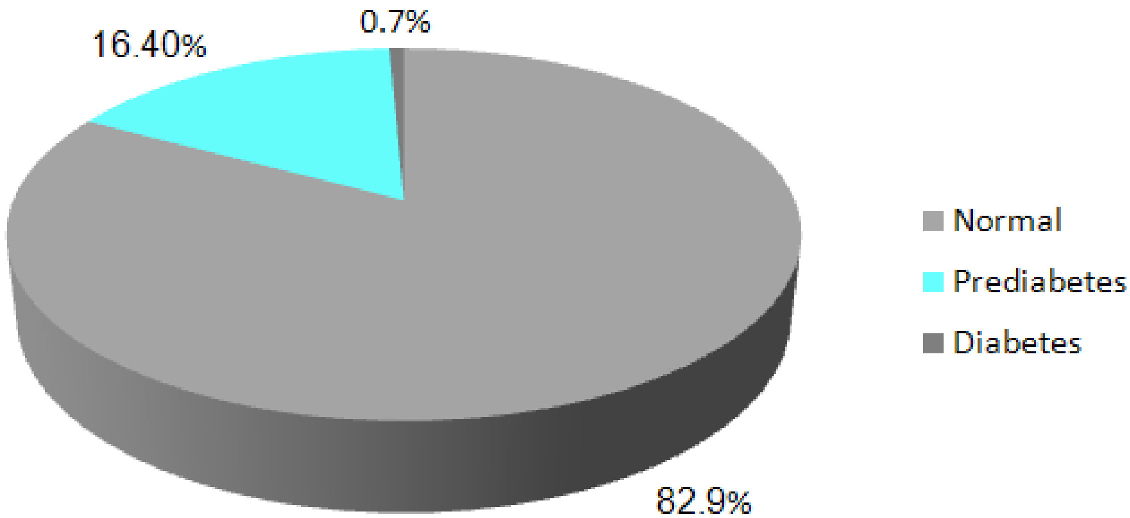

Figure 2. Crude prevalence of fasting blood glucose categories* among Egyptian adolescents; *(ADA, 2003).

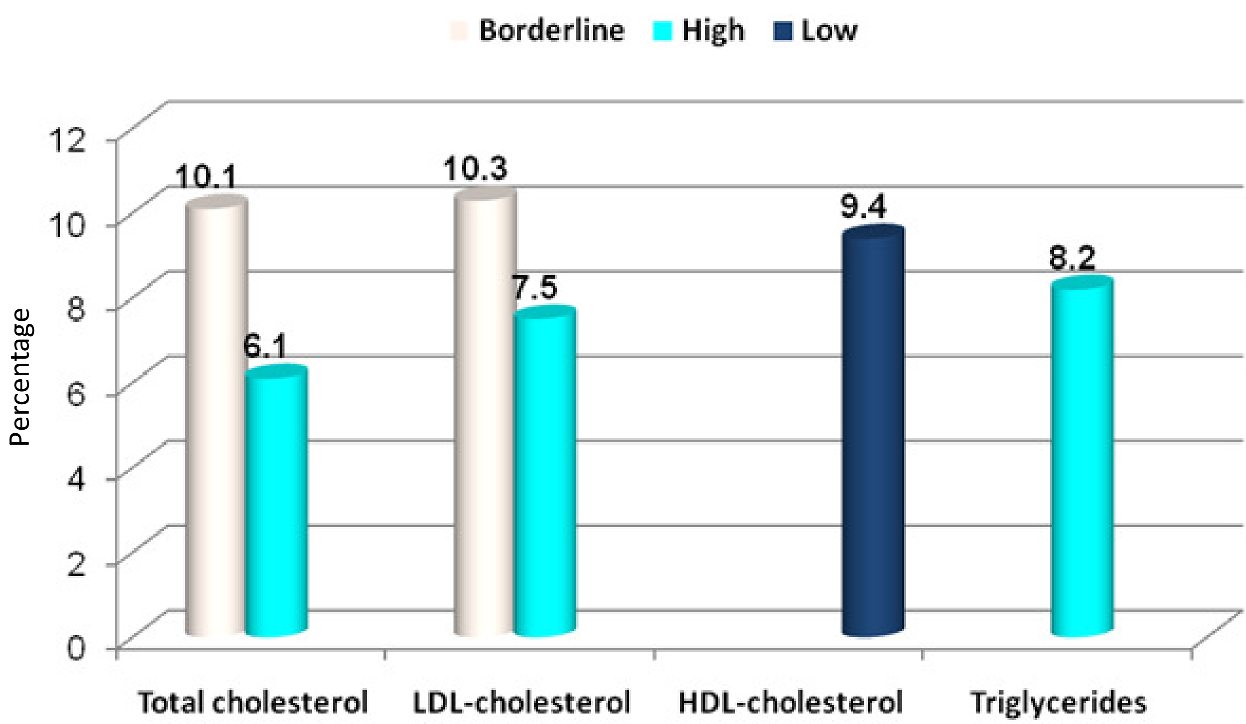

Figure 3. Crude prevalence of dyslipidemia categories* among Egyptian adolescents; *(NCEP, 1993).

low HDL cholesterol 9.4%.

Figures 4, 5 and 6 reveals that the crude prevalence of hypertension among adolescents aged 10 to 18 years is 1.4% for both types of hypertension. For systolic blood pressure, it was found that male adolescents were nearly at the same risk as female- adolescents while female adolescents are at more risk (28.7%) when compared to males (23.6%) regarding diastolic blood pressure. Figure 7 shows that the nationwide prevalence of metabolic syndrome among Egyptian adolescents is 7.4%. Figure 8 illustrates the pattern of physical inactivity among adolescents by sex, about half of female and third of male adolescents did not practice any form of physical activity. Figure 9 shows the prevalence of tobacco use among

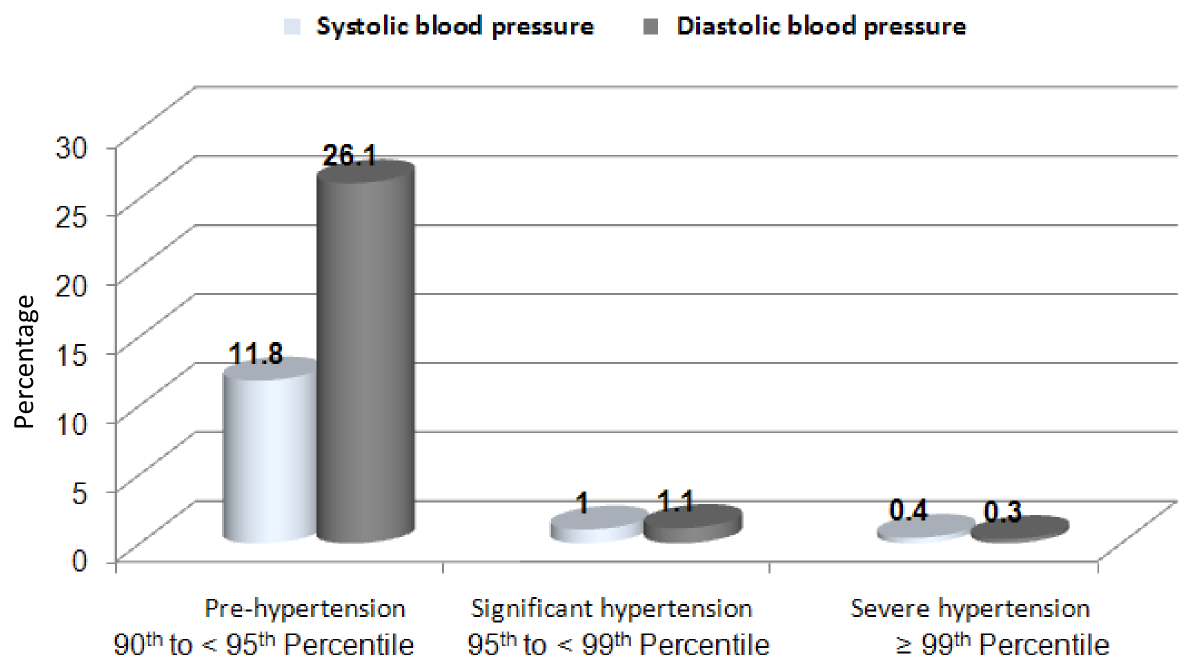

Figure 4. Crude prevalence of high blood pressure categories* among Egyptian adolescents; *NHBPEP (2004).

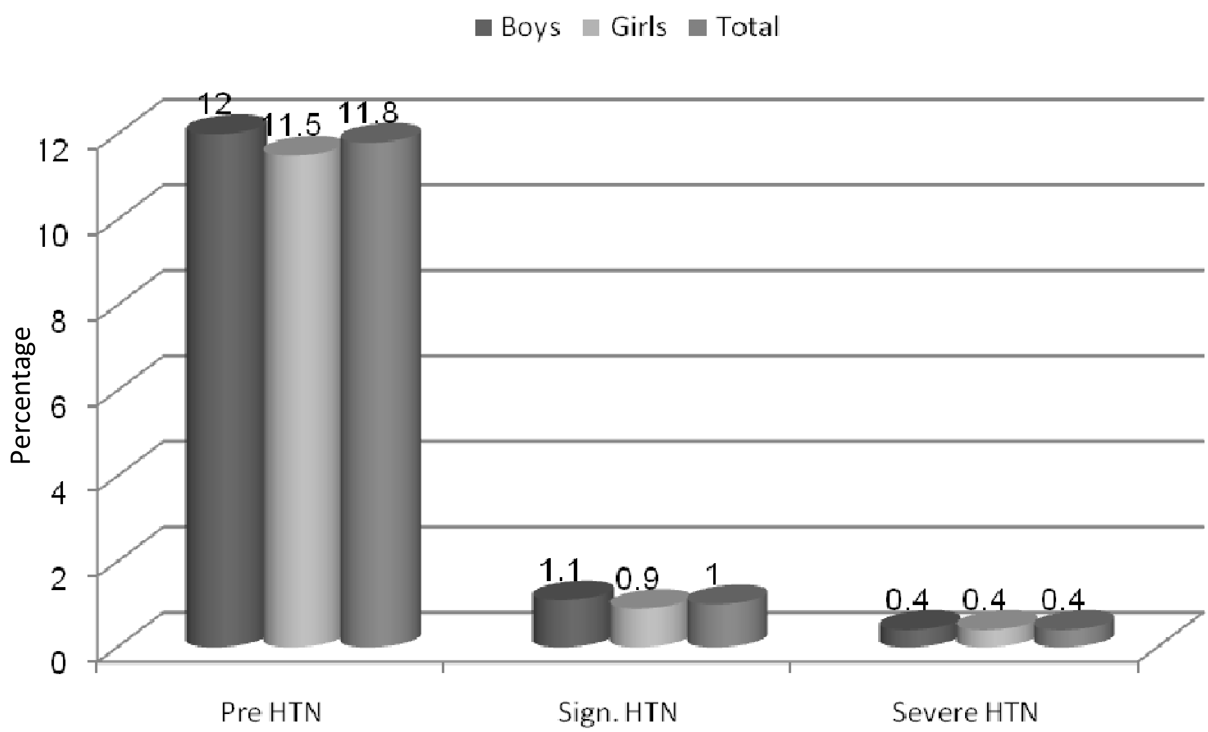

Figure 5. Prevalence of systolic hypertension categories by sex; HTN* = hypertension.

adolescents where about two third of the adolescents were exposed to smoking by families and friends and about 7% were regular smokers. Figure 10 shows frequency distribution of some bad dietary habits among adolescents. Breakfast was skipped by almost 50% of adolescents. One third of the students did not include basic food groups in their diet. Pickles and salt intake are high in nearly 25% of participants. More than 50% of

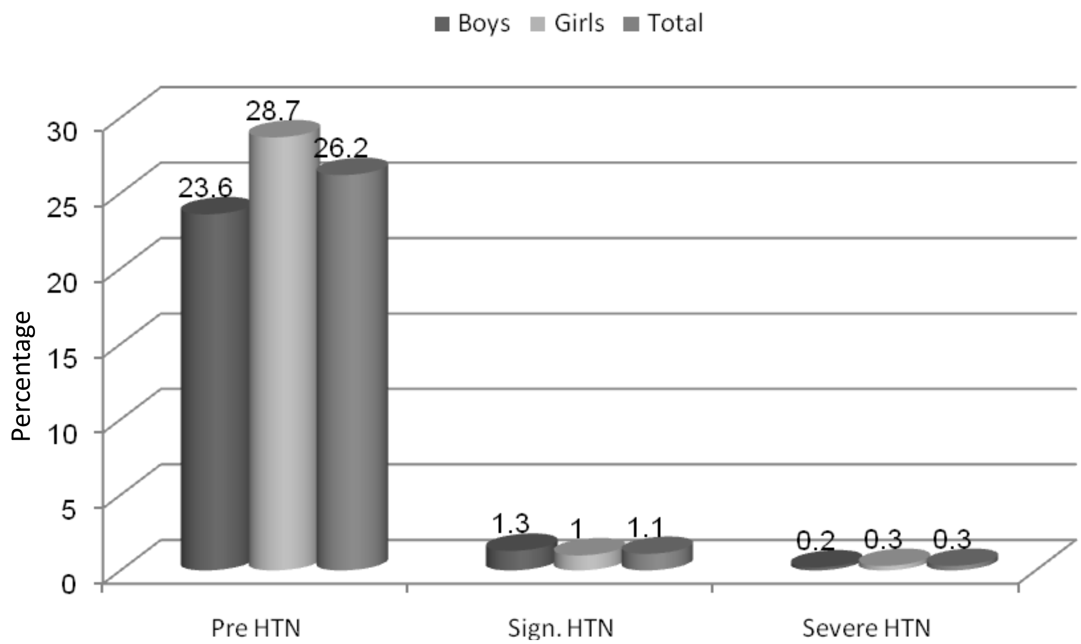

Figure 6. Prevalence of dyastolic hypertension categories by sex.

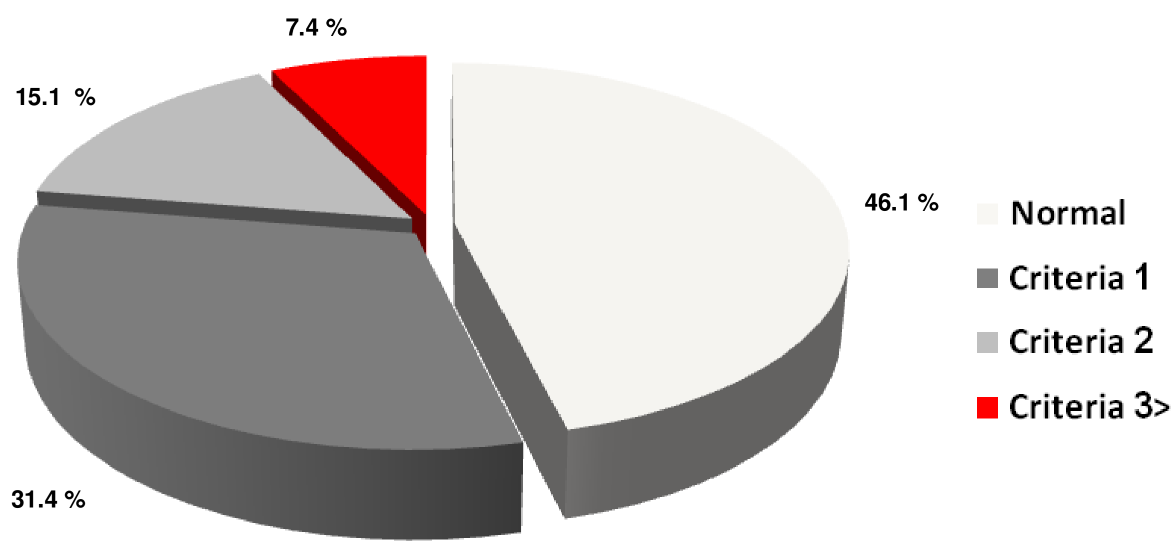

Figure 7. Crude prevalence of metabolic syndrome* among Egyptian adolescents; *(NCEP, 2001, 2004).

adolescents reported frying as the usual way of cooking preferred by their families.

DISCUSSION

Prevalence data are important for the surveillance of overweight and obesity and related chronic non communicable diseases and their risk factors among children and adolescents, provided similar cut-off values and references are used consistently. Based on BMI (NCHS and CDC, 2000), data from several nationally representative surveys carried by NNI and EDHS (2008) revealed that the overall prevalence of overweight and obesity among this age group ranged between 19 to 23% with higher prevalence rates among females (22.9 to 29.6%) compared to males (14.7 to 20.7%) (Table 1, Figure 1). Our findings were nearly parallel to those of Saudi study (19, 317 healthy children and adolescents from 5 to 18 years of age) where the overall prevalence in all age

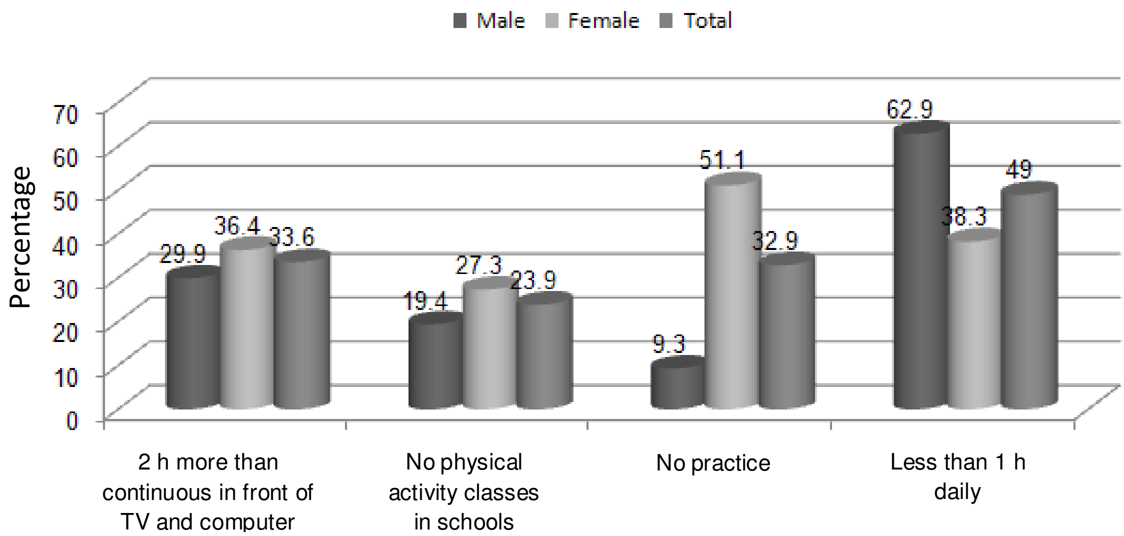

Figure 8. Pattern of physical inactivity among adolescents by sex.

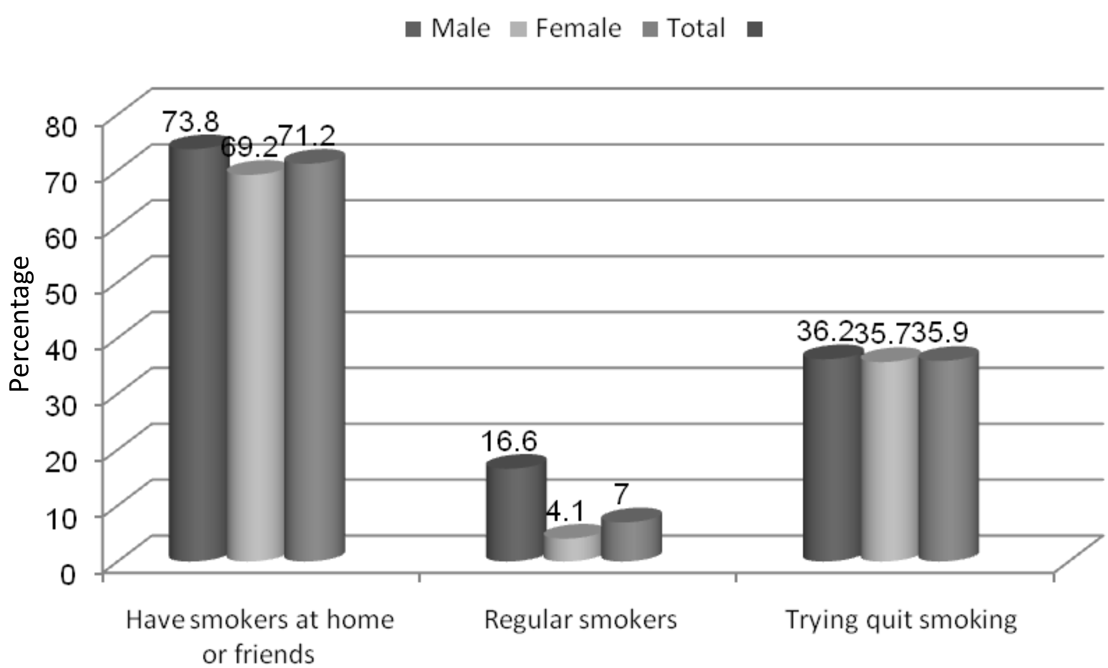

Figure 9. Prevalence of tobacco use among adolescents by sex.

groups were 20.4 and 5.7% for overweight and obesity respectively according to CDC reference (Mohammad et al., 2010). A paper reviews studies on the prevalence of overweight, obesity and related nutrition-related non-communicable diseases in Bahrain, Kuwait, Qatar, Oman, Saudi Arabia and the UAE, revealed that adolescent overweight and obesity are among the highest in the world, with Kuwait having the worst estimates (40 to 46%) (Ng et al., 2010). Our results were consistent with a report from Mexico, in a nationally representative sample of 10- to 17-year-old children collected in the year 2000, where there was a higher prevalence of overweight and obesity in girls than in boys, although our prevalence levels were lower (20.5 vs. 24.7%) than those reported from Mexico (del Rvo Navarro et al., 2004). Another study from Greece showed nearly similar findings as the prevalence of overweight and obesity for adolescents (11 to 17 years) were 19.0 and 2.6%, respectively. The prevalence was 25.9 and 5.1% for all males, and 19.1 and 3.2% for all females, respectively

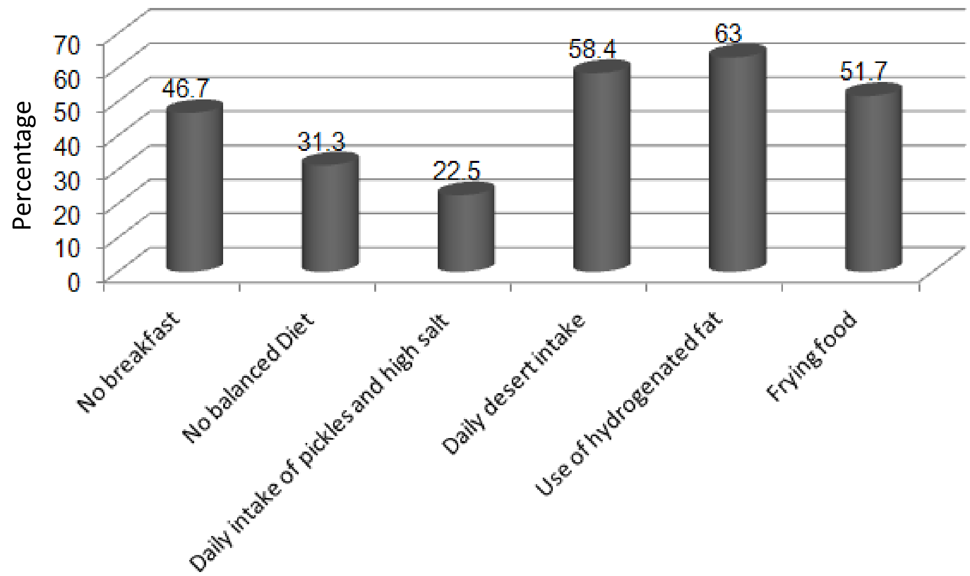

Figure 10. Prevalence of some bad dietary habits among adolescents.

(Krassas et al., 2001). In another report from a representative sample of US children collected between 2003 and 2006, the prevalence of overweight (BMI >85th percentile) and obesity (BMI >97th percentiles) in children 2 to 19 years of age was 31.9 and 11.3%, respectively (Ogden et al., 2008). This was much higher than the prevalence rates of 13.4 and 7.1% reported in our study. However, the difference is difficult to interpret because of the different age groups between the different studies. This difference may be due to time factors (difference in data collection) or a truly lower prevalence in our populations. It seems that the prevalence of overweight and obesity in our population is the least compared to those of Saudi, Kuwait, the US and Mexico. The overall pattern of gender variation in the prevalence of overweight and obesity indicating a higher prevalence of overweight in girls, is consistent with patterns reported from Mexico, UAE, and Saudi Arabia (del Rvo Navarro et al., 2004; Malik et al., 2007; Al-Almaie, 2005). However, the opposite pattern (higher prevalence in boys) was true for the prevalence of obesity in those studies and is inconsistent with our results. Repeated cross-sectional surveys in England revealed that obesity prevalence increased from 1995 to 2007 from 3.1 to 6.9% among boys, and 5.2 to 7.4% among girls. Assuming a linear trend, the 2015 projected obesity prevalence is 8.0% (4.5, 11.5) in male and 9.7% (6.0, 13.3) in female adolescents (Stamatakis, 2010). Ogden and Flegal (2010) stated that, if these trends were to continue, by 2030, 30% of all children and teenagers in the United States will be obese. This alarming prediction highlights the importance of finding effective means of reversing the trends toward increased obesity among children. The imbalance of energy intake from food and energy expended through physical activities is the central physical problem most often studied in childhood obesity. This is essentially a question of individual and family behavior; it is therefore difficult to understand, measure, and change. In addition, less tangible factors also affect childhood obesity: for example, the child's mental health and sleep patterns. These are influenced by the home, school, and community environments (Narayan et al., 2003). Children, adolescents, and parents/caretakers of infants and young children receive conflicting messages from society and media. For example, fewer opportunities for physical activities in school, increasing value placed on academic achievement, and media advertisement of unhealthy food choices all conflict with messages stressing obesity health risks (Jennifer, 2010).

Obesity is the sixth major risk factor for the overall burden of disease globally, and is associated with a constellation of metabolic derangements starting early in life (Valsamma et al., 2010). The findings in this study reveal a prevalence of 26% for prehypertension and 1.4% for high systolic and diastolic blood pressure, 16.4% for prediabetes, 16.2% for borderline and high total cholesterol, 17.8% for borderline and high LDL-cholesterol, and 8.2 %, for high triglycerides, 9.4% for low HDL cholesterol and 7.4% for metabolic syndrome. Galhotra et al. (2009) stated that long term epidemiological studies support the concept that atherosclerosis has its inception in childhood, and it has also been shown that risk factors which accelerate it originate in the same age group. It has further been shown in various studies that prevalence of risk factors for non communicable diseases in childhood and adolescence bears a significant tendency towards development of disease in adulthood. Such research has documented that adolescence is the appropriate time period for appropriate intervention. Galhotra et al. (2009) reported that systolic hypertension (BP >140 mmHg) was found in 1.7% boys and 0.7% girls. Diastolic hypertension (BP >90 mmHg) was found in 0.7% girls and it is seen that BMI is positively associated with D.B.P. In a study at Jaipur, Rajeev et al. (1998) found hypertension in 9% boys and 6.1% girls. Singh et al. (2006) found systolic hypertension in 11.82% boys and 3.03% girls. Diastolic hypertension was found in 3.58% boys and 0.43% girls. The increasing prevalence of impaired fasting glucose in adolescents has paralleled the obesity epidemic and shows no signs of reversal. Despite this, data in adolescents are sparse (Julia et al., 2007). Multiple studies suggest alarming increases in the incidence of T2DM, and up to 30% of childhood new-onset diabetes are classified as T2DM (Likitmaskul et al., 2003). Impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) are both considered 'pre-diabetes'. IGT is defined as a 2 h plasma glucose of 140 to 199 mg/dl and is typically asymptomatic. IGT has been found to be an independent risk factor for the development of T2DM and cardiovascular disease. Early diagnosis and treatment of individuals with IGT have been shown to prevent progression to T2DM (Tsay et al., 2010). Therefore, the American Diabetes Association (ADA) recommends lifestyle modification with or without pharmacological interventions in both children and adults with pre-diabetes (ADA, 2008). Hee et al. (2006) demonstrated that Korean overweight children and adolescents aged 10 to 18 years had more elevated blood pressure, more adverse lipid levels, and more clustered numbers of CVD risk factors than did normal-weight counterparts. However, caution should be taken when comparing the data with other results, because different definitions for overweight status and CVD risk factors are used. Herein, overweight was used interchangeably with obesity, similar to a majority of US studies. Another study by (Everaldo and João, 2006) stated that the high prevalence of bad elevated lipid profiles (29.7%) among children and adolescents without parental history of coronary artery disease suggests that preventive screening must begin during childhood because it may identify young people at risk of developing premature coronary heart disease in the future. Features of metabolic syndrome (MS) were assessed among obese young individuals in the UAE. Of the 260 obese young people screened, 44% were found to have MS. Prevalence of MS was more among boys than girls and there was a significant association with a positive family history of obesity, diabetes or hypertension. This present study showed a prevalence of metabolic syndrome that is consistent with many other studies in which the authors used the modified NCEP definition (NCEP, 2001, 2004) as they reported a prevalence of MS among adolescents that ranged from 1.7 to 14.3% (Lambert et al., 2004; Cook et al., 2003; De Ferranti et al., 2004). The findings in this study revealed strong positive relationships between BMI and blood pressure levels; systolic and diastolic, as well as serum lipids except for HDL-c and fasting blood glucose, may be the small number of obese subjects made these findings statistically insignificant. Accordingly, the study showed that health benefits were gained from elimination of obesity as reflected on having serum lipid levels in acceptable ranges (Table 4). Freedman et al. (1999) reported that approximately 25% of overweight children of both genders have high cholesterol, which is higher than the overall youth population of the Bogalusa heart study. In a German study, total and LDL cholesterol concentrations did not correlate significantly with the degree of overweight (Reinehr et al., 2005). Hee et al. (2006) found that all types of lipids were significantly associated with overweight. In contrast to blood pressure and lipid profiles, fasting glucose concentrations did not increase according to the increase in overweight status. However, in the Taipei children heart study, a significant correlation between obesity and high fasting glucose is reported (Chu et al., 1998). The presence of high BP and abnormal lipid levels in overweight children meets the criteria of the metabolic syndrome, also known as the insulin resistance syndrome (Gillian et al., 2005).

The findings in this study revealed that about half of female and a third of male adolescents did not practice any form of physical activity and no physical activity classes in about one fourth of schools; moreover, about a third of the adolescents sit in front of television and computers more than 2 h daily. Our results looks less than those reported by the study of Galhotra et al. (2009), as he observed that 70.7% boys and 71.6% girls were not engaged in physical education class and, 32.9% boys and 21.4% girls spent ≥ 3 h per day watching TV/computer games, etc. In a similar study at Delhi by Singh (2006); 54.4% boys and 69.3% of the girls were not engaged in sports at school or at home. This could be because of the greater stress being laid on academics in the school and at home. Regarding the life style related habits, the present study illustrated that about two third of the adolescents were exposed to smoking by families and friends and about 16.6 % of boys and 4.1% of girls were regular smokers. Galhotra et al. (2009) study revealed that 8.2% and 6.3% of boys and girls had smoked at least once in the last month, respectively. In a similar study at Delhi, 3.6% boys and 1.3% girls have smoked at least once in the past month. Singh et al. (2006) found 3.6% of boys and 1.3% girls had smoked more than once in the last one month. Madan et al. (2006), in his study for tobacco use among school going children in Chennai city, India, found that prevalence of tobacco use was 41.1% among 1225 school children. Global youth tobacco survey conducted in Delhi, India, shows that one in ten students (10%) had used tobacco in any form (Monika et al., 2005). Despite the facts that the harmful effects of tobacco chewing and smoking are widely known, many young people start smoking during adolescence, largely because they believe that smoking will boost their social acceptability and image. Adolescents' need to gain social approval from peers can lead to smoking, as can their desire to appear like adults. Family influences also play a role; adolescents whose parents or siblings smoke are more likely to use tobacco.

Once adolescents have experimented with smoking, approximately 50% continue to smoke and become addicted.

In this study, we examined the prevalence of some bad dietary habits that is associated with increasing prevalence of obesity among adolescents (Figure 10). Schnohr et al. (2003) revealed that only 26 to 41% report that they eat vegetables on a daily basis and only 19 to 30% report that they eat fruits every day. Regarding the consumption of soft drinks, nearly half of the older group reported drinking them daily. Jennifer and Peter (2001) found that overweight females were the most likely to regularly skip breakfast and normal weight males were least likely to skip breakfast (18 versus 10%), and that older females were more likely than older males to skip breakfast (25 versus 16%). Another study reported by Abdallah et al. (2009) showed that meal skipping is common, particularly among those of low socioeconomic status and the intakes of many nutritious foods such as animal food items, fruits and vegetables and dairy foods seem to be low among adolescents of low SES. This requires a continuing effort aimed at monitoring the dietary patterns of this population in order to follow up on the dietary patterns and the health of this population. In conclusions, the problem of overweight and obesity appears to be emerging rapidly among this age group in Egypt. Type 2 DM, hypertension and cardiovascular risk factors in adolescents are serious in terms of morbidity and mortality suggesting that they are an appropriate target for screening. School-based programs promoting healthy eating, increasing physical activity and cessation of smoking are recommended for prevention of obesity and related diseases, Everaldode and João (2006)

REFERENCES

Abdallah HA, Hein S, Zumin S, Yehia A, Gerd HO (2009). Sociodemographic correlates of food habits among school adolescents (12–15 year) in north Gaza Strip, BMC Public Health, 9:185.

ADA (2008): American Diabetes Association; Standards of medical care in diabetes. Diabetes Care, 31: S12-S54.

ADA (American Diabetes Association), (2003). American Diabetes Association New Revised Guidelines for PreDiabetes.

Al-Almaie SM (2005): Prevalence of obesity and overweight among Saudi adolescents in Eastern Saudi Arabia. Saudi Med J., 26:607-11.

Allain CC, Poon LS, ChenCS (1974). Enzymatic determination of total serum cholesterol. Clin. Chem., 20: 470-75.

Amina AS, Benova L, Sholkamy H, Marmot M (2009). addressing the dual burden of malnutrition in Egypt: do conditional cash transfers have a role? Report: http://www.iussp.org/Activities/hequity/reportlondon09.pdf

Chu NF, Rimm EB, Wang DJ (1998). Clustering of cardiovascular disease risk factors among obese schoolchildren: the Taipei Children Heart Study. Am. J. Clin. Nutr., 67: 1141–1146.

Cook S, Weitzman M, Auinger P (2003). Prevalence of a metabolic syndrome phenotype in adolescents: findings from the third National Health and Nutrition Examination Survey, 1988–1994. Arch. Pediatr. Adolesc. Med., 157: 821-827.

De Ferranti SD, Gauvreau K, Ludwig DS (2004). Prevalence of the metabolic syndrome in American adolescents: findings from the Third National Health and Nutrition Examination Survey. Circulation, 110: 2494–2497.

de Onis M, Blössner M, Borghi E (2010). Global prevalence and trends of overweight and obesity among preschool children. Am. J. Clin. Nutr., 92: 1257-1264.

del Rvo-Navarro BE, Velαzquez-Monroy O, Sαnchez-Castillo CP, Lara-Esqueda A, Berber A, Fanghõnel G (2004). The high prevalence of overweight and obesity in Mexican children. Obes. Res., 12: 215-223.

DNPCNCD (Diet, nutrition and prevention of chronic non-communicable diseases) (2005). National survey of National Nutrition Institute, Cairo, Egypt.

Dryer RL (1970). In fundamerntals of clinical chemistry.NW Teiz.NW, ed. WB saunders, Philadelphia, 329p.

EDHS (2008) Egypt demographic and Health Survey.

Elizabeth WKM, Kathleen K, John MP, Stephen MT, David BD, Xavier FGO, Shane AN (2010). The prevalence of stunting, overweight and obesity, and metabolic disease risk in rural South African children; BMC Public Health, 10: 158.

Everaldo de F, João GBA (2006). Dyslipidemia Among Adolescents and Children from Pernambuco. Arq Bras Cardiol., 87(6): 661-665

Fernandez JR, Redden DT, Pietrobelli A (2004) waist circumference percentiles in children and adolescents. J. Pediatr., 145: 439-444.

Finley PR (1978). Determination of high density lipoprotein (HDL) cholesterol in serum or plasma. Clin. Chem., 24: 931.

Freedman DS, Dietz WH, Srinivasan SR, Berenson GS (1999). The relation of_overweight to cardiovascular risk factors among children and_adolescents: the Bogalusa Heart Study. Pediatrics, 103: 1175-1182.

Friedwald WT, Lovey RI, Fredriekson DC (1972) Estimation of concentration of LDL-lipoproteins separated by three different methods. Clin. Chem., 28: 2077.

Galhotra A, Abrol A, Agarwal N, Goel NK, Gupta S (2009). Life Style Related Risk Factors For Cardiovascular Diseases In Indian Adolescents. Internet J. Health, 9(2).

Gillian SB, Joanna K, Bonita F, Samuel G, Sandra H (2005) Effect of Obesity and High Blood Pressure on Plasma Lipid Levels in Children and Adolescents. Pediatrics, 116: 442-446

Hassan HA, Abdel GA, Moussa W (2004). National survey for the determination of BMD among adolescents and adults, Cairo, NNI.

Hee MK, Jong P, Ho-Seong K, Duk HK, Sung HP (2006). Obesity and Cardiovascular Risk Factors in Korean Children and Adolescents Aged 10–18 Years from the Korean National Health and Nutrition Examination Survey, 1998 and 2001; Am. J. Epidemiol., 164: 787-793.

Jelliffe DB (1966). The Assessment of Nutritional Status of the Community. World Health Organization, Geneva.

Jennifer AOD, Peter C (2001). Association between socioeconomic status, weight, age and gender, and the body image and weight control practices of 6- to 19-year-old children and adolescents, Health Educ. Res., 16(5): 521-532.

Jennifer JB (2010). Confronting Childhood Obesity: Educational Needs of Children, Adolescents, and Parents, from Medscape Public Health & Prevention , http://www.medscape.com/publichealth.

Julia RD, Kate LL, Ana B, Karen LS (2007). Dietary patterns, fasting glucose, BMI, and waist circumference in US adolescents http://apha.confex.com/apha/135am/techprogram/paper_161230.htm

Krassas GE, Tzotzas T, Tsametis C, Konstantinidis T (2001). Prevalence and trends in overweight and obesity among children and adolescents in Thessaloniki, Greece. J. Pediatr. Endocrinol. Metab., 14(Suppl 5): 1319-26; Discussion 1365.

Kruger R, Kruger HS, MacIntyre UE (2006). The determinants of overweight and obesity among 10- to 15-year-old schoolchildren in the North West Province, South Africa – the THUSA BANA (Transition and Health during Urbanisation of South Africans; BANA, children) study Public Health Nutrition Cambridge University Press, 9: 351-358

Lambert M, Paradis G, O'Loughlin J (2004). Insulin resistance syndrome in a representative sample of children and adolescents from Quebec, Canada. Int. J. Obes. Relat. Metab. Disord., 28: 833-841.

Likitmaskul S, Kiattisathavee P, Chaichanwatanakul K, Punnakanta L, Angsusingha K, Tuchinda C (2003). Increasing prevalence of type 2 diabetes mellitus in Thai children and adolescents associated with increasing prevalence of obesity. J. Pediatr. Endocrinol. Metab., 16: 71-77.

Madan KPD, Poorni S, Ramachandran S (2006). Tobacco use among school children in Chennai city, Indian J. Cancer, 43 (3): 127-13.

Malik M, Bakir A (2007) Prevalence of overweight and obesity among children in the United Arab Emirates. Obes. Rev., 8: 15-20.

Mohammad I, El M, Peter JF, Abdullah SAH, Abdullah AAS, Ahmad AAO, Mansour MQ, Tatjana K (2010). Prevalence of overweight and obesity in Saudi children and adolescents Ann Saudi Med., 30: 203-208.

Monika A, Srinath K, Hriday R (2005): Health Related Information Dissemination Amongst Youth), New Delhi and Department of Cardiology, All India Institute of Medical Sciences and Executive Director- HRIDAY, New Delhi, India Global Youth Tobacco Survey (GYTS)- Delhi, India; Indian Pediatr. 850, Vol. 42.

Narayan KM, Boyle JP, Thompson TJ, Sorensen SW, Williamson D. (2003). Lifetime risk for diabetes mellitus in the United States. JAMA, 290: 1884-1890.

National center for health statistics (NCHS) in collaboration with national center for chronic disease prevention and health promotion (CDC), (2000). Body mass index for age- percentiles.

NCEP (2001). National Cholesterol Education Program. Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III): Full Report. Bethesda, Md: National Institutes of Health; 2001. NIH publication No. 01-3670.

NCEP (2004). National Cholesterol Education Program Expert Panel on Blood Cholesterol Levels in Children and Adolescents: Cholesterol and atherosclerosisin children. 2004. Available online at: http://www.americanheart.org/presenter.jhtml? Identifier = 4499. Accessed 20 July 2004.

NCEP (National Cholesterol Education Program), (1993): U.S. Department of Health and Human Services; National Institute of Health, National Heart, Lung, and Blood Institute, NIH Publications, 9: 93-3102.

Ng SW, Zaghloul S, Ali HI, Harrison G, Popkin BM (2010). The prevalence and trends of overweight, obesity and nutrition-related non-communicable diseases in the Arabian Gulf States. Obesity Reviews, no. doi: 10.1111/j.1467-789X.2010.00750.x).

NHBPEP (2004): National High Blood pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The Fourth Report on the Diagnosis, Evaluation and Treatment of High Blood Pressure in children and Adolescents. Pediatrics, 114 (2): 555-557.

Ogden CL, Carroll MD, Flegal KM. (2008): High body mass index for age among US children and adolescents 2003-2006. JAMA. 299: 2401-2405.

Ogden CL, Flegal KM (2010). Changes in terminology for childhood overweight and obesity. Natl. Health Stat Rep., 25: 1-5.

Quetelet (1830 - 1850). Statistical measure of the weight of a person scaled according to height. It was invented between 1830 and 1850 by the Belgian polymath Adolphe Quetelet during the course of developing "social physics".

Rajeev G, Anuradha G, Shweta K, Monica A, Renu C, Jain BK (1998). Ind. Heart J., 50: 511-515.

Reinehr T, Andler W, Denzer C. (2005). Cardiovascular risk_factors in overweight German children and adolescents:_relation to gender, age and degree of overweight. Nutr_Metab Cardiovasc Dis., 15: 181-187.

Schnohr C, Pedersen JM, Alcón MCG, Curtis T, Bjerregaard P (2003) Trends in the dietary patterns and prevalence of obesity among Greenlandic school children , Health, Nuuk.

Shaheen FM, Hathout M, Tawfik AA (2004) National Survey of Obesity in Egypt. Final report. Cairo, NNI.

Shaheen FM, Tawfik AA (2000). National Survey of Intrahousehold food distribution among Egyptian families. Final report. Cairo, NNI.

Singh AK, Ankit M, Nidhi S, Anand K (2006). Life style associated Risk factors in adolescents. Indian J. Pediatr., 73: 901-906.

Stamatakis E, Zaninotto P, Falaschetti E, Mindell J, Head J (2010). Time trends in childhood and adolescent obesity in England from 1995 to 2007 and projections of prevalence to 2015. J. Epidemiol. Comm. Health, 64: 167-174.

Temple RC, Clark PM, Hales CN (1995) Measurement of insulin secretion in type 2 diabetes: problems and pitfalls. Diabetic Med., 9: 503-512.

Tsay J, Pomeranz C, Hassoun A, Zandieh SO, Rutledge J, Vogiatzi MG, Oberfield SE, Motaghedi R (2010). Screening Markers of Impaired Glucose Tolerance in the Obese Pediatric Population; Horm Res. Paediatr., 73: 102-107.

WHO (2005). Chronic Diseases: A Vital Investment. WHO Geneva, Switzerland.

WHO (2010). Framework for the implementation of global strategy on diet, physical activity and health in the eastern Mediterranean region.