Taha and Marawan, J Child Adolesc Behav 2015, 3:5
DOI: 10.4172/2375-4494.1000236

Journal of Child & Adolescent Behavior

Research Article Open Access

Socio-behavioral Determinants of Overweight and Obesity in Egyptian Primary School Children

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Abstract

Objectives: This study was conducted to assess socio-behavioral factors of overweight and obesity in primary Egyptian school children such as: residence, type of school, parent education, entertainment and dietary behaviors.

Methods: The study was cross sectional and was conducted from May 2013 to August 2014 in Menoufia governorate in Egypt. 354 children aged 8-12 years brought consent from parents to participate and were enrolled in the study. The BMI percentile for students was calculated using a percentile online calculator.

Results: The prevalence of childhood overweight and obesity was 23.7% and 19.5% respectively. The most important predictors to overweight and obesity in the students were eating restaurant food at least twice weekly, TV watching more than 2 hours per day, mother employment and pocket money.

Conclusion: Values for overweight and obesity in our study have approached the developed world high values. The most important risk factors for obesity and overweight in the developing societies that should be targeted by policy makers are restaurant foods, TV watching, mother employment and pocket money.

Keywords: Risk factors; Obesity; Overweight; Egyptian; 1year school children

Introduction

Childhood obesity has reached global pandemic levels and has been called one of the most serious public health challenges of the 21st century [1]. For preventing childhood obesity, there must be a public health approach which addresses the risk factors for this health problem [2].

Weight gain in children can occur if energy intake is higher than energy expenditure. Complex factors stand behind this imbalance including genetic, biological, environmental and psychosocial influences. However, behavioral and social factors rather than changes in biological or genetic ones seem to play significant roles in raising the prevalence of childhood obesity [3]. A variety of studies report an association between childhood obesity and social factors such as income, socioeconomic status and parental education [4,5].

Behavioral factors that have been associated with childhood weight gain and obesity in school-aged children include consuming more energy via beverages and energy-rich foods and lack of physical activity [6]. Nowadays, children lack the required amount of physical activity which may be due to spending much time in front of television sets, watching computers and playing video games [7]. Low and middle income countries have picked up many of the modern habits associated with obesity; watching television, buying processed foods at supermarkets, and eating more food away from home [8]. The emerging epidemic of obesity in these countries is of special concern because it creates a dual burden of disease in these countries which still struggle with under nutrition problem [9]. Children are specially more prone to make unhealthy eating choices due to being influenced by television advertisements of energy-rich and sugar-rich foods [10]. Moreover, they are more attracted by the western diets and are more susceptible than adults to change their eating behaviors due to globalization of fast foods and soft drinks [11].

Short-term and long-term complications have been associated with childhood obesity. They include disorders in lipid profile, altered glucose metabolism and increased risk of hypertension, diabetes and cardiovascular diseases. Superadded is the psychological impact such as poor self-image and lowered self-esteem [12].

Our study was performed to provide information to policy makers about socio-behavioral risk factors in order to be targeted by prevention programs.

Methods

Study design

This cross-sectional study was carried out from May 2013 to August 2014 in Menoufia governorate; one of 27 governorates in Egypt. Agriculture, industry and commerce are the main activities of the population. Shebin El-Kom city is the capital for the governorate. It has school enrollment, health care, and poverty levels close to the national Egyptian average [13].

Study population

A multistage random sampling technique was used. First, Shebin el-kom district was chosen randomly from the 10 districts of Menoufia Governorate. It has 102 primary governmental schools (28 of which are language schools); their names were obtained from the Educational Directorate of Menoufia. Two language and 2 ordinary schools were chosen from the Shebin el-kom district list of schools. Inside each school, a class from each educational grade from 3rd to 6th grade (8–12 years) was randomly chosen to represent this grade. 1st and 2nd graders

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Received July 05, 2015; **Accepted** August 28, 2015; **Published** September 03, 2015

Citation: Taha AA, Marawan HM (2015) Socio-behavioral Determinants of Overweight and Obesity in Egyptian Primary School Children. J Child Adolesc Behav 3: 236. doi:10.4172/2375-4494.1000236

were excluded because of their young age. The total number of students in the 4 schools aging from 8 to 12 years was 639.

Permissions were obtained from the administrators of the four selected schools after thorough explanation of the study. Consent forms with information sheets clarifying aims of study were handed out to the students along with the questionnaire assessing socio-behavioral factors for obesity and overweight to be filled and signed by their parents. The total number of students who brought approved consent and returned the filled questionnaire was 354 with a response rate of 55.4%.

Questionnaire

We used a closed-ended questionnaire which had two sections; the first section included personal information: name, gender, residence (urban versus rural), type of school (ordinary versus language), mother employment (employed versus non-employed) and father occupation (laborer versus employee versus professional). The second section was concerned about other socio-behavioral factors including pocket money, entertainment factors (computer entertainment, TV watching and sport practice) and dietary ones (taking breakfast or not, eating fruits, eating raw and cooked vegetables, eating sweets, eating restaurant food, eating salty snacks like potato chips, popcorn or crackers and drinking milk and soft drinks). "Restaurant food" item in the questionnaire asked about foods brought from restaurants which are common in the locality and eaten as a main meal such as hamburger, pizza and Shawarma which is a Levantine Arab meat preparation, where lamb, chicken, turkey, beef, veal, or mixed meats are placed on a vertical spit and grilled for as long as a day.

We used a 2 point scale for the second section of the questionnaire to represent the frequency of some selected nutrient intakes and frequency of different entertainment sources.

Anthropometric measurement

The researchers personally measured height and weight for the students by means of an electronic scale (model no. HJKH-02, country: China, brand name: Sincoly). Measurements were taken at each school after instructing the students to take off heavy clothes and shoes. Weight was measured to the nearest 0.5 kg. Height was measured to the nearest 0.1 m without shoes.

BMI (body mass index) was then calculated for the students by dividing weight in kg by the square height in meters [14]. After BMI was calculated for students, the BMI percentiles for each gender were calculated using CDC online calculators [15]. Weight status categories for students were thereafter calculated according to the following categories [14].

Underweight: <5th percentile

Normal weight: from 5th to <85th percentile

Overweigt: from 85 to <95 percentile

Obese: ≥95 percentile

Statistical analysis

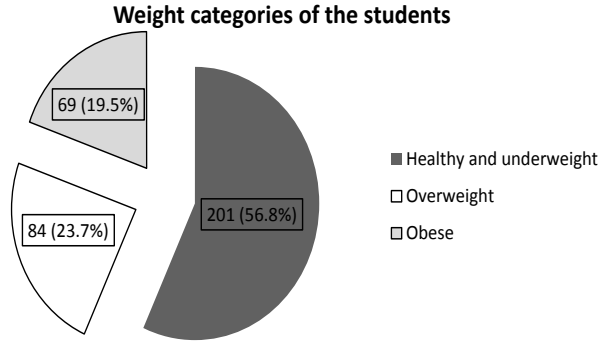
Statistical analyses were carried out Statistical package for Social Sciences Version 20 [16]. Continuous variables (pocket money and BMI) were assessed for normality of distribution which revealed non-normal distribution. Contingency tables and chi-squared tests were used to examine the relationship between weight status categories of the students and the socio-behavioral risk factors that might have contributed to their overweight and obesity. Odds ratios and 95% confidence intervals were calculated. Spearman correlation was used to test correlation between pocket money given to students and their BMI. Binary logistic regression was used to determine the predictor variables independently associated with overweight and obesity in children. Statistical significance was set at $p \leq 0.05$ (two-tailed).

Results

Median (range) for BMI of students was 21.2 (1.4 to 37) while median (range) for pocket money obtained by students was 3 (0 to 15).

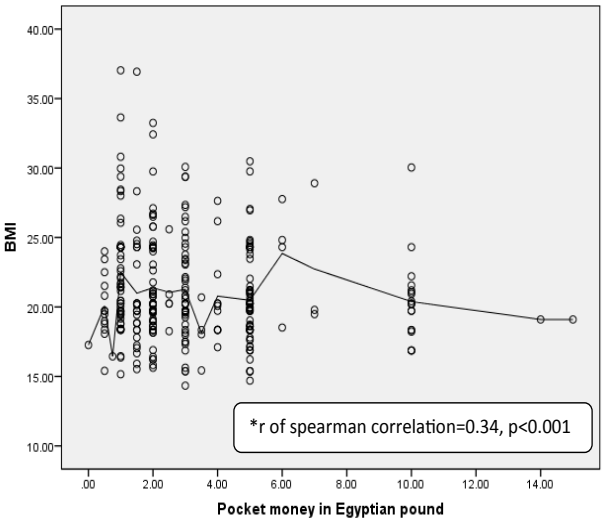
Figure 1 shows 19.5% (69 students) were overweight, 23.7% (84 students) were obese while 56.8% (201 students) had either normal weight or were underweight. There is a positive significant correlation between pocket money and BMI of the students (r=0.34, p<0.001) (Figure 2).

Table 1 shows that residence and mother employment were significantly associated with overweight and obesity. 71% of overweight/obese students resided in the urban area compared to 58% in normal/underweight group (x^2=6.4, p=0.011, OR=1.8). About 60% of the overweight/obese group mothers were employed females compared to 40% in normal/underweight group(x^2=13.5, p<0.001, OR=2.2) . In Table 2 the only



*About 2% of the students had underweight (8 students)

Figure 1: Percentage of different weight categories in the students.



*Chi square of the model is 59.9 with a p value <0.001.

Figure 2: Correlation between BMI of students and their pocket money.

entertainment source significantly related to obesity and overweight in the students was TV watching. More than 73% of the overweight/obese students watched TV at least 2 hours daily compared to 53% in normal/underweight group(x^2=14.7, p<0.001, OR=2.4).

The dietary behavioral factors associated with student overweight and obesity in the students were salty snacks and restaurant food (Table 3). Nearly, 82% of overweight/obese and students ate salty snacks more than once daily compared to 69% in normal/underweight group

Personal factors	Obese and overweight No (%)	Normal and underweight No (%)	OR	95%CI	X^2	P value
Gender: Male Female	 71 (46.4) 82 (53.6)	 92 (45.8) 109 (54.2)	0.9	(0.6, 1.5)	0.01	0.906
Residence: Urban Rural	 109 (71.2) 44 (28.8)	 117 (58.2) 84 (41.8)	1.8	(1.1, 2.8)	6.4	0.011
School: Ordinary Language	 86 (56.2) 67 (43.8)	 121 (60.2) 80 (39.8)	1.2	(0.8, 1.8)	0.57	0.450
Father occupation: Laborer Employee Professional	 21 (13.7) 50 (32.7) 82 (53.6)	 38 (18.9) 67 (33.3) 96 (47.8)	--	--	1.9	0.368
Mother employment: Employed Non-employed	 91 (59.5) 62 (40.5)	 80 (39.8) 121 (60.2)	2.2	(1.4, 3.4)	13.5	<0.001
Note: OR = Odds ratio; CI = Confidence interval.						

Table 1: Personal factors related to obesity and overweight.

Entertainment sources	Obese and overweight No (%)	Normal and underweight No (%)	OR	95%CI	X^2	P value
Computer/day: ≥1 hr <1 hr	 111 (72.5) 42 (27.5)	 138 (68.7) 63 (31.3)	1.2	(0.8, 1.9)	0.63	0.427
TV watching/day: ≥2 hrs <2 hrs	 112 (73.2) 41 (26.8)	 107 (53.2) 94 (46.8)	2.4	(1.5, 3.8)	14.7	<0.001
Sport /week ≥2 times/week <2 times/week	 41 (26.8) 112 (73.2)	 58 (28.9) 143 (71.1)	1.1	(0.7, 1.8)	0.18	0.669

Table 2: Entertainment sources related to obesity and overweight.

Dietary behavioral factors	Obese and overweight No (%)	Normal and underweight No (%)	OR	95%CI	X^2	P value
Breakfast: Yes No	 27 (17.6) 126 (82.4)	 47 (23.4) 154 (76.6)	0.7	(0.4, 1.2)	1.7	0.189
fruits: once/day rarely	 11 (7.2) 142 (92.8)	 11 (5.5) 190 (94.5)	1.3	(0.6, 3.2)	0.51	0.328
Raw vegetables once/day rarely	 21 (13.7) 132 (86.3)	 25 (12.4) 176 (87.6)	1.1	(0.6, 2.1)	0.13	0.721
Cocked vegetables: 3 times /week rarely	 129 (84.3) 24 (15.7)	 171 (85.1) 30 (14.9)	1	(0.6, 1.9)	0.04	0.844
Soft drinks: 3 times /week rarely	 121 (79.1) 32 (20.9)	 165 (82.1) 36 (17.9)	0.8	(0.5, 1.4)	0.51	0.477
Sweets: ≥once/day rarely	 137 (89.5) 16 (10.5)	 176 (87.6) 25 (12.4)	1.2	(0.6, 2.4)	0.33	0.564
Salty snacks: ≥once/day rarely	 125 (81.7) 28(18.3)	 138 (68.7) 63 (31.3)	2	(1.2, 3.4)	7.7	0.005
Milk: ≥once/day rarely	 49 (32) 104 (68)	 59 (29.4) 142 (70.6)	1	(0.7, 1.8)	0.29	0.588
Restaurant food: ≥twice/week rarely	 71 (46.4) 82 (53.6)	 37 (18.4) 164 (81.6)	3.8	(2.4, 6.2)	32.2	<0.001

Table 3: Dietary factors related to obesity and overweight.

Predictors	Regression coefficient	S.E	Wald X^2	P value
Restaurant food	1.2	0.26	22.76	<0.001
Mother employment	0.67	0.24	8.06	0.005
TV	0.65	0.27	5.99	0.014
Pocket money	0.12	0.05	5.01	0.025
Salty snacks	0.42	0.28	2.2	0.138
Residence	0.33	0.30	1.24	0.265
*Omnibus test of model coefficients has a chi-square of 59.9 for the model with a p value<0.001.				

Table 4: Logistic regression analysis of socio-behavioral risk factors for childhood overweight and obesity.

(x^2=7.7, p=0.005, OR=2). About 46% of overweight/obese students ate restaurant food at least twice weekly compared to 18% in normal/underweight group (x^2=32.2, p<0.001, OR=3.8).

Table 4 shows the regression coefficients and the Wald statistic, with its corresponding level of significance. Variables have been arranged in descending order according to the Wald statistic to show their relative predictiveness for overweight and obesity. According to these results, risk factors—such as restaurant food eating, mother employment, TV watching, and pocket money—were the only significant predictors to overweight and obesity in the students.

Discussion

The obesity pandemic originated in the world's rich industrialized countries in the developed world before, remarkably, it has been transmitted to the poor developing countries [17].

By the year 2010, the prevalence of overweight and obesity in developed countries was about double that in developing countries (11.7 and 6.1%, respectively) [18] and about 25–33% of all children in many developed countries were either overweight or obese by the year 2000 [19].

The high prevalence of overweight and obesity in our study (Figure 1) agrees to some extent with values described by a recent Egyptian study in primary school children which reported 17.7% and 13.5% for overweight and obesity respectively [20]. It also agrees with findings from a survey developed and administered by the World Health Organization (WHO) and the Center for Disease Control (CDC) and was conducted in 7 African countries. In that survey, overweight was highest prevalent in Egypt (31.9%); almost four times that of Ghana. Moreover, Egypt had the highest obesity prevalence in that study at 9.3% [21].

A number of social and environmental factors have been linked to childhood obesity epidemic thus addressing these factors is a must in preventing this epidemic [22].

Our study shows that factors significantly associated with overweight and obesity in children were residence and mother employment (Table 1), TV watching (Table 2), pocket money (Figure 2), salty snacks and restaurant foods (Table 3). However, in multivariate analysis (Table 4), the most important predictors to overweight and obesity in the students were salty snacks, TV watching, mother employment and pocket money.

The effect of residence (urban versus rural) on childhood obesity varies between developed and developing countries. A recent study declared that in developed countries, urban children are more likely to be less obese than rural ones while in the developing countries the urban children tend to develop obesity than their peers in rural areas [23]. This finding was also consistent with our study.

A study sponsored by the National Institute of Child Health and Human Development and conducted on 990 children explains the effect of mother employment on BMI of children, in that the average child belonging to an employed mother tends to be heavier by one to two pounds than children of non-employed mothers. Furthermore, researchers in that study found a positive correlation between numbers of years spent in mother's work during her children's growing-up stage and the children's weight. The researchers explained this finding by the possibility that working parents may have little time to prepare healthy food [24].

An association exists also between childhood obesity and skipping breakfast as reported in the study of Hawkins et al. The researchers in that study found that obese children were about twice as likely not to eat breakfast as normal weight children. They explained their findings by the likelihood of more snacking and eating sugary foods in children who skip breakfast than children who don't [25].

In our oriental societies, food preparation at home is mainly the sole responsibility of the wife not the husband which makes it so difficult for the employed mother to prepare healthy foods and breakfast at home all the days of the week. This lack of time in preparing healthy foods at home, can urge students to skip breakfast at their homes, buy more snacks from school canteens and buy restaurant foods. To avoid restricting women rights in being employed and earning their life and at the same time providing students with healthy foods, some solutions can be made. One of them is encouraging family education programs to be implemented before marriage for the new couple to orient them with sharing responsibilities for better family life. Schools can also make important contributions by providing healthy meals to students at a low price.

Story et al. [26] concluded that schools in developed countries have been making progress in improving the school food and providing healthier meals to the students but they recommended much more work to be done through stronger policies specially that of limiting students access to unhealthy foods during school day [26].

Televisions, computers, and video games are among the many "screens" used in entertainment at any time of day. Researchers have consistently found that the more TV children watch, the more likely they are to gain excess weight [27]. This agrees with findings in our study where we found most of the overweight/obese students watched TV at least 2 hours per day.

The existing link between screen time and obesity can be explained by the increased snacking and lack of physical activity associated with increased screen time as demonstrated by research [28]. In addition, there is a link between screen time and reduced fruit and vegetable consumption and increased consumption of unhealthy food high in fat, salt and free sugar [29]. That is why some authors argue that Television advertising, rather than watching, is associated with obesity [30].

American children aging from 2 to 7 years watch TV for about four and a half hours per day. During this time, 19 minutes are allocated for advertising of about 12 food ads [31].

Some studies also spoke about a direct association between TV advertisement and obesity [32]. Some other simulation studies have shown that the absence of TV food advertising decreases the rate of overweight and obesity for 6 to 12 year old children by about 25% and 40%, respectively [33].

The findings from many studies about the link between TV watching and obesity encouraged many authors to set recommendations for children and teens to limit TV/media time to 1 to 2 hours per day [34].

In our study, the majority of obese and overweight students ate salty snacks on a daily basis and a great proportion of them bought restaurant foods.

Consumption of junk food as a snack contributes to childhood obesity. In Wansink et al. study, they found that children who ate potato chips needed significantly more calories to achieve satiety than children who ate a combination snack [35]. A Harvard University study declares that potato chip is the biggest demon behind obesity. It states that potato chips are the biggest dietary offender. They are even bigger than soda, candy and ice cream [36]. Addiction to other junk foods as burgers, pizza and Shawarma is also high because it is tasty. These foods usually have high amount of saturated fats which could increase risk of obesity [37]. This what have urged some authors to propose a tax on junk food as a way to fight the childhood obesity crisis [38].

Researchers also recommend that Parents and teachers should motivate children on healthy spending of their pocket money. This recommendation comes from a recent study on adolescent children, where researchers found that pocket money given by parents to their children could influence their eating habits and affect their general health. Other authors directly linked provision of generous pocket money to obesity. They found that children mostly spend that money on high-energy, fatty and sugary foods that contributed to the development of overweight and obesity [39]. This agrees with and can explain the significant positive correlation between pocket money and BMI of the students in our study (Figure 2). However, Gregori et al. argues that consumption of high energy dense foods is not responsible for high prevalence rates of overweight and obesity if a healthy lifestyle is adopted [40].

Agreeing with this is a study conducted among 10–12 year Greek girls where researchers demonstrated that participation in extracurricular sports activity for 3 hours per week was inversely related to obesity in that study [41]. So there is a critical need to arrange for the availability of a regular physical activity in schools specially that children spend most of their daily hours at school [42]. However, in our study there was no significant role for sport practice in development of overweight or obesity in children. This finding may be attributed to small number of students practicing sport in the study.

Nowadays children are fond with screen activities (TV, computer and mobile) which may have encroached on their interest in practicing physical activity. This had pushed some authors to recommend limiting screen time to less than 2 hours daily [43].

Dollman et al. declared that school physical activity has declined in many countries [44]. Hence school environment can greatly help in health promotion for the students, some authors recommended that physical activity should be made compulsory at schools and allocated equal status as other school subjects [45].

Limitations of the Study

One of the limitations of our study was reliance on parent report instead of child self-report of snack consumption. However this was done because a great number of students in the primary schools in Egypt have difficulty in writing, reading and comprehension. Moreover, most of them have difficulty in accurately describing the time they spend in entertainment. Another limitation of the study was not asking about the type of sport practiced by the students and whether practiced inside or outside schools.

Conclusion and Recommendations

Our study confirms the findings that the developing world is not excluded from the rising epidemic of childhood obesity and that values for overweight and obesity in developing world have approached the developed world values. It also gives a red flag about risk factors for childhood overweight and obesity in developing countries that should be targeted by policy makers through prevention programs.

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