Adolescent obesity in Lebanese private schools

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**Background:** Obesity has become a public health problem worldwide. Our objective was to calculate the prevalence of overweight and obesity. **Methods:** It is a cross sectional study of adolescents in private Lebanese schools, aged 10–18 years. Gender, birth date and measures of weight and height were recorded. **Results:** In 12,293 adolescents, we found high prevalence of obesity (7.3%) and at risk of obesity (24.4%). In girls, risk of obesity and obesity prevalence decrease with increasing age ($P < 10^{-5}$) as compared with that in boys. **Conclusion:** Early recognition of obesity should become routine in paediatric ambulatory care settings.

**Keywords:** children and adolescents, Lebanon, obesity, private schools

Obesity is the most rapidly growing form of malnutrition in the developed world. In 1994, the National Health and Nutrition Examination Survey III (NHANES III) found a prevalence of overweight, including obesity, among children aged 6–17 years of 25%, compared with 10% in 1971. Not only are adolescents becoming heavier, but the most rapid increase in body fat seems to happen in the population of already obese individuals, probably reflecting a change in environmental factors in a population already susceptible to obesity. Adolescent obesity is a strong predictor of adult obesity. It is well established that 70–80% of obese adolescents will remain obese as adults. Obesity is responsible for the increasing prevalence of serious health outcomes and is a leading preventable cause of death.

In addition to physical illnesses, increased body fat mass in adolescents is also associated with psychological isolation, low self-esteem, and development of eating disorders. Adult obesity has been associated with depression, especially in females, particularly in cases of extreme obesity.

In Lebanon, the prevalence of overweight, including obesity, is beginning to be established in different age groups. A study conducted in a rural community, in 2003, demonstrated a 30.2% prevalence of obesity in women. Another cross-sectional survey of a sample of 2104 children (3–19 years of age) and adults, showed prevalence rates of at risk of obesity and obesity higher, overall, for boys than girls (22.5% versus 16.1% at risk and 7.5% versus 3.2% obese, respectively). This finding was associated with lack of exercise in children. No study was specifically designed for children or adolescents in schools.

The objective of our study was to calculate the prevalence of obesity by sex and age groups in adolescents in Lebanese private schools.

**Methods**

**Study design**

This is a cross-sectional study conducted on a sample of adolescents in private Lebanese schools, aged between 10 and 18 years.

**Sampling procedure**

From the list of Lebanese private schools, a conveniently proportionate sample of 33 schools was chosen, distributed over all Lebanese regions. Directors of these schools were contacted, and 23 (67%) agreed to participate in the current study: 5 in Beirut, 12 in Mount Lebanon, 3 in North Lebanon, 1 in South Lebanon, and 2 in the Bekaa. The schools refusing to participate included students considered of equivalent socioeconomic status to the ones that agreed to participate.

**Data collection**

Body measures were taken between November 2002 and May 2003. An enquirer was sent to record gender, birth date, and measure weight and height of all students in the required age group, in collaboration with the school health professional. Absent students were approached for data collection after the absence period was over. No students refused to participate since it was required by the school authorities. One calibrated balance and one stadiometer for height measurement were used; shoes were systematically removed, and measurements were made with light indoor clothing only.

Body mass index (BMI) calculated as mass in kilograms over height in metres squared was used to evaluate obesity, since this is a practical, useful, and preferred index to assess body fat.

**Statistical analysis**

Data entry and analysis were performed on SPSS statistical software, version 11.5. Chi-squared tests were used to compare prevalences within age groups and between boys and girls.

For every year of rounded age, percentiles were calculated, allowing curves to be drawn for weight in kg, height in cm, and BMI in kg/m², according to the method described by Cole in 1992. Obesity and at risk of obesity were defined according to cut-off values taken from the International Obesity Taskforce for BMI of children aged 2–18 years, where centile curves were drawn, which at age 18 years passed through the widely used cutoff points of 30 and 25 kg/m² for adult obesity and overweight.

**Results**

**Descriptive statistics**

In all 5529 (45.0%) boys and 6770 (55.0%) girls were included in the study, making a total of 12,299 Lebanese adolescents. Exact age was available for 12,129 adolescents: 2601 (21.1%)
were 10–12 years, 6238 (50.7%) were 12.5–15 years, and 3290 (26.7%) were 15.5–18 years old. BMI curves were drawn for boys and girls (figure 1A and B).

**Obesity prevalence**

In table 1, we present obesity prevalence difference between boys and girls; obesity prevalence is 2.5 times higher in boys than in girls. Boys at risk of obesity are almost 1.5 times more numerous than girls ($P < 10^{-4}$).

In girls, there are significant differences in obesity prevalence between age groups, and overweight and obesity prevalence decreases with age ($P < 10^{-3}$), in comparison with boys.

**Discussion**

Our results are almost comparable with those obtained in Lebanon for boys versus girls by Sebai et al., 22.5% versus 16.1% for overweight and 7.5% versus 3.2% for obesity, respectively. They are also comparable with those reported for the American population, with 10.9% of obese and 22% at risk of obesity children aged 6–17 years of age. Our results are inferior to those reported for school children and adolescents in Taiwan and Fuchien areas, Spain, and the Italian provinces. However, they are higher than those obtained for many countries such as Japan, Singapore, Taiwan, Germany, and the Netherlands. Furthermore, given the low sensitivity of the International Obesity Task Force cut-off values for detecting obesity, sensibly higher results would be expected if BMI measures would be replaced by more sensitive measures; this would put our Lebanese children and adolescents at one of the highest points of the international ladder regarding obesity and at risk of obesity prevalence.

One possible explanation for these numbers is the sample restriction, since higher socioeconomic status of private schools would allow higher adoption of unhealthy nutritional habits (fast food, energy-dense snacks, sweets, etc.) and

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**Figure 1** (A). Body mass index of Lebanese boys. (B). Body mass index of Lebanese girls
lower consumption of traditional healthy Mediterranean food (cereals, vegetables, and fruits). In fact, it is a general observation in Lebanon that children of higher socioeconomic status have higher opportunities of eating in fast food restaurants than those of lower socioeconomic status, the latter being more prone to eat less expensive and less fatty home-made platters. There is also the possibility that these children sit longer in front of their personal television, video games, or computers. This observation is consistent with the general tendency in developing countries of an increasing prevalence of obesity in parallel with increasing socioeconomic status, in contrast to Western countries.

In our study, the prevalence of obesity was almost triple in boys than in girls ($P < 10^{-4}$). It is possible that the Western feminine self-image and fear of obesity are more marked in Lebanese girls than in boys. In fact, it has been demonstrated that girls as young as 5 years of age care more about their self-image and associate it to weight status. The same has been reported for Taiwan and Fuchian areas, where boys had higher prevalence of obesity than girls in all ages.

Lower age classes were significantly associated with higher obesity prevalence in girls. This may be due to a generation effect, where newer generations would be adopting new nutrition and physical activity habits and be more prone to obesity; another possible explanation is that increasing age would be associated with increased self-image care and fear of obesity, with consequential changes in nutritional habits and physical activity in order to decrease weight. However, this age difference was not found in Lebanese boys. The latter result is in contrast to those in Taiwan and Fuchian areas, where the highest prevalence of obesity than girls was between 10 and 12 years of age.

More studies are needed to explain the nutritional behaviour of Lebanese adolescents, in addition to the evaluation of the impact of globalization and Westernization of social habits on Lebanese society, in addition to interactions with genetic, hormonal, biological, psychological, and environmental factors in causing obesity.

Prevention of obesity before adulthood is important, because it would be too difficult to lose weight by adulthood. Early recognition of obesity is important; it is possible by routine assessments of eating and activity patterns in children, in addition to evaluation of weight gain relative to linear growth throughout childhood. Longer periods of outdoor playing should be recommended, aiming to increase energy expenditure and acquire less body fat by the time of early adolescence.

According to the guidelines for the childhood obesity prevention programme, living actively, eating in healthful ways, and creating a nurturing environment that respects cultural food habits and family traditions should be emphasized.

In conclusion, prevalences of obesity and risk of obesity in Lebanese adolescents of private schools are high. Early recognition of excessive weight gain, education, and appropriate interventions are of utmost importance.

### Key points
- Obesity prevalence in Lebanese school children is not known.
- Lebanese private schools adolescents, particularly boys, present high prevalences of obesity and risk of obesity.
- Paediatricians are supposed to identify children at greater risk early, in order to achieve a more favourable prognosis.

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References


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