

# Relative Risks of Becoming Overweight and Obese in Children after 6 Years in Secondary School

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The authors carried out a longitudinal study of bodyweights of secondary-school children from Grade VII to Grade XII. Initial data of weight for height at Grade VII showed that the prevalences of overweight boys and girls were 13.6% and 9.9% and of obesity of boys and girls 26.8% and 13.5%, respectively. However, when these children were at Grade XII the prevalences of overweight of boys and girls were 14.0% and 10.5% and of obesity of boys and girls were 15.0% and 10.8%, respectively. The relative risks of becoming overweight of boys and girls at Grade XII who were already overweight at Grade VII were 1.5 and 4.0 respectively, and the relative risks of obesity in boys and girls at Grade XII who were already obese at Grade VII were 1.4 and 4.6, respectively. The present study showed that without any nutritional intervention those children, especially girls who were overweight and obese were more likely to maintain their bodyweights throughout the 6-year period in secondary school.

**Keywords:** Obesity, Overweight, School children, Relative risk

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With an increasing number of people affected at all ages, obesity has become one of the major health problems of many countries. More children all over the world are becoming obese and overweight. Certainly childhood obesity is a serious public health problem because of its strong association with adult obesity and the related adverse health consequences, both in the short and long term. Those who advance into obesity in adulthood are likely to have serious health consequences such as hypertension, cardiovascular disease and diabetes. Excess weight in children is thought to be widely prevalent and to be increasing. During the past decade, the prevalence of overweight children has grown all over the world and at an accelerating rate<sup>(1-6)</sup>. Epidemiological studies showed that sedentary behavior such as playing video games and watching television are linked with the prevalence of childhood obesity<sup>(7-9)</sup>. Energy-dense diets and bad eating habits are also the cause of the increase in the rate of overweight and obesity in

children<sup>(10)</sup>. Recent data from Cochranis analysis of interventions for treating obesity in children could not draw absolute conclusions of any cost-effective programs<sup>(11)</sup>. Therefore, it is plausible that the preventive measure of overweight in children is the best strategy in decreasing the prevalence of childhood obesity. Preventive programs should start as soon as possible. Without appropriate preventive measures, those who are overweight and obese at younger ages tend to have a higher risk of becoming overweight and obese at older ages. Thus, The authors conducted a longitudinal study on relative risks of becoming overweight and obese in children after 6 years in secondary-school without any nutritional intervention.

## Material and Method

The authors conducted a longitudinal study of weights and heights of school children in 3 secondary schools in Bangkok beginning at Grade VII and followed their weights and heights until they were at Grade XII in the schools. There are 453 girls and 205 boys who have been completely followed every year.

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From the beginning of the study the students were divided into 3 groups as obese, overweight and non-overweight. The obese group is defined as weight for height  $\geq 120\%$  of standard weight for height of Thai children using data from the recent survey of Thai children of the Ministry of Public Health of Thailand<sup>(1)</sup>. The overweight group is defined as weight for height between 110% and  $<120\%$  of standard weight for height of Thai children. The non-overweight group is defined as weight for height  $<110\%$  of standard weight for height of Thai children.

Relative risks of becoming overweight and obese after 6 years in school of these children were calculated from the prevalences of overweight and obesity of these 3 groups when they were at Grade XII compared to their prevalences in the beginning of the study at Grade VII.

## Results

The prevalences of overweight at Grade VII of boys and girls are 13.6% and 9.9% and the prevalences of boys and girls at Grade XII are 14.0% and 10.4%, respectively. The prevalences of obesity in the first year in school (Grade VII) in boys and girls are 26.8% and 13.5%, and the prevalences in Grade XII are 15% and 10.8%, respectively (Table 1).

The relative risks (RR) of becoming overweight in the non-overweight and non-obese group at Grade XII of boys and girls are 0.7 and 0.7, respectively. The RR of becoming overweight in the overweight group in boys and girls at Grade XII are 1.5 and 4.0, respectively. The RR of becoming overweight in the obese group in boys and girls at Grade XII are 0.6 and 0.9, respectively.

The RR of becoming obese in the non-overweight and non-obese group in boys and girls at Grade XII are 0.1 and 0.2, respectively. The RR of becoming obese in the overweight group of boys and girls at Grade XII are 0.6 and 0.9, respectively. The RR of becoming obese in the obese group of boys and girls at Grade XII are 1.6 and 4.6, respectively.

## Discussion

The present study groups are from 3 public secondary schools in Bangkok. The prevalences of overweight and obesity in boys are 13.6% and 26.8%, while in girls are 9.9% and 13.5%, respectively. These prevalences of obesity in boys are relatively high compared to the data from the national survey recently published by the Ministry of Public Health that was 14%. Boys who are relatively more active

**Table 1.** Prevalence of overweight and obesity in the same children at Grade VII and Grade XII

	Boys		Girls	
	Grade VII	Grade XII	Grade VII	Grade XII
Gr I (Non-overweight and non-obese)	59.6%	71%	76.6%	78.8%
Gr II (Overweight)	13.6%	14%	9.9%	10.4%
Gr III (Obese)	26.8%	15%	13.5%	10.8%

**Table 2.** Relative risks of becoming overweight and obesity in school children at Grade XII

Relative risks	Group I		Group II		Group III	
	Boys	Girls	Boys	Girls	Boys	Girls
Becoming Overweight at Grade XII	0.7	0.7	1.5	4.0	0.6	0.9
Obesity at Grade XII	0.1	0.2	0.6	0.9	1.6	4.6

Group I = Non-overweight and non-obese group at Grade VII

Group II = Overweight group at Grade VII

Group III = Obese group at Grade VII

than girls may have less activity these days. High competition in school as well as more sedentary behavior, such as spending more time watching television and playing video games may be other reasons for the high prevalence. Thus, there is no doubt that the prevalence of overweight and obesity in Thai children is increasing at remarkable rates. However, the prevalence of obesity of boys at Grade XII or at adolescent age decrease from 26.8% to 15%. Therefore, to study the prevalence of obesity in boys and girls, investigators should specifically determine the age group of the children.

From the present study, the relative risks of becoming overweight after 6 years in school of those who are already overweight are extremely high. Likewise, the relative risk of becoming obese after 6 years in school in those who are already obese is outstandingly high, especially in girls. Noticeably, the results indicated that without appropriate interventions, the overweight and obese groups will likely maintain their nutritional status while there are new cases from the normal body weight group becoming overweight and obese yearly. Mei, et al recently showed the same tendency in infancy<sup>(12)</sup>. In their study, the relative risks of becoming overweight among overweight infants at 2, 3 and 4 years old was 3.5, 3.3 and 2.9 respectively.

During the past decades, thousands of studies in obesity both in children and adults have been published worldwide. But very few of these showed any obvious results in prevention and treatment of obesity, especially in children<sup>(13-15)</sup>. Despite having abundant knowledge of the urgency in treating childhood obesity, effective preventive measures in social, economic and political level are not being taken. Also clear nationwide policies in every country have not yet been publicized. Researchers, then, should coordinate at all levels in searching for the most suitable approaches in this area in order to prevent childhood obesity advancing into adulthood obesity. From the present study, it is clear that school and family must join together in the prevention of childhood and adulthood obesity.

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## ความเสี่ยงสัมพัทธ์ในการมีน้ำหนักเกินและการเป็นโรคอ้วนในเด็ก ภายหลัง 6 ปี ในโรงเรียนมัธยมศึกษา

พิภพ จิรวิญญู, นฤมล เด่นทรัพย์สุนทร, ดวงเดือน ชินรุ่งเรือง, เรณู วงษ์อาณ, นุชน้อย ธรรมมนศิริ

คณะผู้วิจัยได้ทำการศึกษาโดยการติดตามเป็นระยะในเรื่องน้ำหนักตัวเด็กนักเรียนในโรงเรียนมัธยมศึกษา ตั้งแต่ชั้นมัธยมศึกษาปีที่ 1 จนถึงชั้นมัธยมศึกษาปีที่ 6 พบว่า อุบัติการณ์ของการมีน้ำหนักเกินในนักเรียนชายและหญิง ในชั้นมัธยมศึกษาปีที่ 1 เท่ากับ 13.6 และ 9.9% ตามลำดับ และอุบัติการณ์ของโรคอ้วนในนักเรียนชายและหญิงเท่ากับ 26.8% และ 13.5% ตามลำดับ เมื่อติดตามจนถึงชั้นมัธยมศึกษาปีที่ 6 พบว่า อุบัติการณ์การมีน้ำหนักเกินในนักเรียนชายและหญิงเท่ากับ 14.0% และ 10.5% ตามลำดับ ขณะที่อุบัติการณ์ของโรคอ้วนในนักเรียนชายและหญิงเท่ากับ 15.0% และ 10.8% ตามลำดับ ความเสี่ยงสัมพัทธ์ในการมีน้ำหนักเกินเมื่อชั้นมัธยมศึกษาปีที่ 6 ในกลุ่มที่มีน้ำหนักเกินเมื่อชั้นมัธยมศึกษาปีที่ 1 ในชายและหญิงเท่ากับ 1.5 และ 4.0 เท่า ตามลำดับ และความเสี่ยงสัมพัทธ์ในการจะเป็นโรคอ้วนเมื่อชั้นมัธยมศึกษาปีที่ 6 ในกลุ่มที่เป็นโรคอ้วนเมื่อชั้นมัธยมศึกษาปีที่ 1 ในชายและหญิงเท่ากับ 1.4 และ 4.6 เท่า ตามลำดับ การศึกษาครั้งนี้แสดงว่าเด็กนักเรียนโดยเฉพาะเด็กหญิงที่มีน้ำหนักเกิน และที่เป็นโรคอ้วน มีความเสี่ยงสัมพัทธ์สูง ในการจะมีน้ำหนักเกินและมีโรคอ้วนเมื่อจบการศึกษาในชั้นมัธยมศึกษาตอนปลาย

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