Increasing Risks of Becoming Obese after 6 Years in Primary School: Comparing the Relative Risks among Some Schools in Bangkok, Saraburi and Sakolnakorn

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The authors carried out a retrospectively study of bodyweights of primary-school children from Grade I to Grade VI in 4 schools from Bangkok, one school from Saraburi and data of school children from a district in Sakolnakorn with a six year follow-up period. In the cohort there were 437 children from Bangkok, 225 children from Saraburi and 633 children from Sakolnakorn. Initial data show that prevalence of obesity at grade I in schools from Bangkok, Saraburi and Sakolnakorn were 16%, 23% and 4%, respectively. However, when these children were in grade VI, the prevalence of obesity increased to 31%, 30% and 9%, respectively. Relative risks of becoming obese at grade VI in children who were overweight and obese at grade I are 3 and 5 fold in Bangkok, 2 and 3 fold in Saraburi, 6 and 12 fold in Sakolnakorn, respectively. The present study shows that prevalence of obesity increased at quite dramatic rates during the primary school period in these study groups.

Keywords: *Obesity, Primary school children, Prevalence, Relative risks*

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Childhood obesity has now become one of the most prevalent diseases in developing and developed countries[1-5]. More than 70% of childhood obesity will advance into adulthood obesity. Diabetes, hypertension and coronary heart disease are consequences from adulthood obesity. More than 50% of medical expenses are spent on diseases related to obesity. Attention has been drawn to the increase of the incidence and prevalence of type II diabetes in children[6].

Environmental, social and behavioral factors have been suggested as potential drivers of the current obesity epidemic. Change in lifestyle of children, such as more television watching and playing more computer games, is one of the factors that is contributing to obesity[7]. Fast food, beverages and snacks are also another contributing factor. Stress from school due to the amount of homework might be another factor. The authors previously found that children from secondary schools had increased risks of becoming obese after 6 years in school if they were overweight in the first years[8]. 6-years in school does not decrease the risk, in contrast, it increases the risks of becoming obese.

Primary school children seem to be less aware of their bodyweights, thus children entering primary schools should be a potential important target group for obesity prevention programmes. Without intervention, the prevalence of obesity might increase in each year in primary schools. Also, those schools which are close to the capital might have more prevalence of obesity than the more distant ones. The authors, thus, conducted a retrospectively study the prevalence of obesity in children from Grade I to Grade VI in primary schools from Bangkok, Saraburi (100-km from Bangkok) and Sakolnakorn (600-km from Bangkok).

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Material and Method

The authors, conducted a retrospective study of weights and height of school children in public primary schools from

Bangkok: 437 children (94 boys, 343 girls) from Rajavinit, Wat Parinayok, Satrivoranaj and Rajini

Saraburi (100-km from Bangkok): 225 children (110 boys, 115 girls) from Anubarn Saraburi

Sakolnakorn (600-km from Bangkok): 633 children (317 boys, 316 girls) from Department of Primary School, Ampur Varichpume

Those who had complete data of weights and heights from Grade I to Grade VI were recruited into the study.

From the beginning of the study the students in Grade I in each school chosen were divided into 4 groups as obese, overweight, normal weight and underweight. The obese group was 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[9]. The overweight group was defined as weight for height between 110% and < 120% of standard weight for height of Thai children. The normal weight group was defined as weight for height between $\geq$ 90% and < 110% of standard weight for height of Thai children. The underweight group was defined as weight for height less than 90% of standard weight for height of Thai children as defined by Waterlow[10].

When these children were in Grade VI, the prevalence of obesity was calculated in all 4 groups using their weights for heights compared to the standard data.

Relative risks of becoming overweight and obese after 6 years in school of these children were calculated from the prevalence of overweight and obesity of these children when they were in Grade VI compared to the prevalence in the beginning of the study when they were in Grade I.

Result

Table 1 shows the prevalence of underweight, normal weight, overweight and obesity of children in Grade I in primary schools from Bangkok, Saraburi and Sakolnakorn. The prevalence of obesity in children in Grade I from a school in Bangkok, Saraburi and Sakolnakorn was 16%, 23% and 4% respectively.

Table 2 shows the prevalence of underweight, normal weight, overweight and obesity of children at Grade VI in primary schools from Bangkok, Saraburi and Sakolnakorn. The prevalence of obesity in children in Grade VI from schools in Bangkok, Saraburi and Sakolnakorn was 31%, 30% and 9%, respectively.

Table 3 shows the percentages of those becoming obese at Grade VI in children from each group of nutritional status when they were in Grade I. Those who were classified as overweight in Grade I from Bangkok and Saraburi had a 50% chance of becoming obese, while those who were overweight from Sakolnakorn had only a 24% chance of becoming obese when they are in Grade VI. Children who are classified as obese in Grade I from Bangkok, Saraburi and Sakolnakorn had a 90%, 70%, and 50% chance of becoming obese, respectively, when they were in Grade VI.

Table 4 shows the relative risks of becoming obese in Grade VI in each group of nutritional status in Grade I. Those children who were obese when they were in Grade I from Bangkok, Saraburi and Sakolnakorn had relative risks of becoming obese of 5.6, 3.1 and 12.5, respectively.

Discussion

The prevalence of obesity in children when they were in Grade I from schools in Bangkok and Saraburi was quite alarming. Almost one fourth of the

Table 1. Prevalence of underweight, normal weight, overweight and obesity of children at Grade I in primary schools from Bangkok, Saraburi and Sakolnakorn

	Under-weight	Normal weight	Over-weight	Obese
Bangkok (n = 437)	11%	56%	17%	16%
Saraburi (n = 225)	7%	60%	10%	23%
Sakolnakorn (n = 633)	29%	59%	8%	4%

Table 2. Prevalence of underweight, normal weight, overweight and obesity of children at Grade VI in primary schools in Bangkok, Saraburi and Sakolnakorn

	Under-weight	Normal weight	Over-weight	Obese
Bangkok (n = 437)	13%	42%	14%	31%
Saraburi (N = 225)	7%	46%	17%	30%
Sakolnakorn (n = 633)	21%	61%	9%	9%

children became overweight and obese before entering primary schools. Higher parental education, parental obesity, physical inactivity, and pattern of child-rearing may be the causes of obesity during the preschool period[11-15]. Bottle feeding and a high consumption of caloric-dense diets are also causes of obesity in these children[16,17].

During 6 years in primary school, the prevalence of obesity did not decrease. In contrast, it increased markedly, especially in schools from Bangkok and Saraburi. The prevalence of obesity in children when they were in Grade VI was higher than the average figure of the whole country (30% vs 18%)[18]. Stress in schools, such as the amount of homework and frequent examinations, as well as less activity during 6 years in schools may be the causes of this high prevalence. It has been well known that education in Asian countries is very competitive. When it is associated with a sedentary life-style in children such as watching television or playing computer games, this aggravates the prevalence of obesity even higher.

Until now there are no effective interventional programs to reduce the weight of those who are already obese, as well as there are no efficient methods in preventing normal weight children from becoming obese during their 6 years in schools. The authors also demonstrated that the children who were overweight and obese in Grade I had remarkably high relative risks of becoming obese when they were in Grade VI. Although twice yearly surveillance for bodyweight and height of children are compulsory in every school in Thailand, the adminstrators of these schools have never used these figures in action to benefit the children.

The high tendency of children becoming obese, nowadays, is clear. If this trend is allowed to go on, the prevalence of obesity in the Thai population in the next 10 years will be much higher than the current figure. The quality of life of Thai people in the next decade will be much lower due to complications from obesity. Parents should pay more attention to their child's bodyweight. Administors of schools should play a larger role in promoting health in their students and preventing obesity. The government should, likewise, play a larger role in terms of prevention of obesity or health promotion by making schools in the country allow students to have more exercise hours during week-days and less homework. Last, but not least, the government should encourage the whole population to have daily exercise as part of their daily activity. We live in an era of affluence and an era of obesity. Exercise and diet restriction are the best tools to combat obesity, which has become one of the most frequent causes of death in our population.

Table 3. Percentages of becoming obese at Grade VI from each groups of bodyweights classified in Grade I*

Percentage of becoming obese	Group I	Group II	Group III	Group IV
Bangkok	2%	16%	48%	90%
Saraburi	6%	11%	52%	71%
Sakolnakorn	0.6%	8%	24%	50%

* Group I to Group IV are classified by bodyweight for height of children at Grade I. Group I = underweight, Group II = normal weight, Group III = overweight, Group IV = obesity

Table 4. Relative risks of becoming obese in children in Grade VI from each group of bodyweight classified in Grade I* schools in Bangkok, Saraburi and Sakolnakorn

Relative risks	Group I	Group II	Group III	Group IV
Bangkok	0.1	1.0	3.0	5.6
Saraburi	0.3	0.5	2.3	3.1
Sakolnakorn	0.2	2.0	6.0	12.5

*Group I to Group IV are classified by bodyweight for height of children at Grade I. Group I = underweight, Group II = normal weight, Group III = overweight, Group IV = obesity

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ความเสี่ยงในการเป็นโรคอ้วนเพิ่มขึ้นภายหลัง 6 ปีในโรงเรียนชั้นประถมศึกษา: การศึกษาเปรียบเทียบความเสี่ยงที่เพิ่มขึ้นนี้ในบางโรงเรียนจากกรุงเทพฯ; สระบุรี และสกลนคร

พิภพ จิรภิญโญ, นฤมล เด่นทรัพย์สุนทร, สุภิญญา คงตระกูลพิทักษ์, เรณู วงษ์อาน, นุชน้อย ธรรมมนศิริ

คณะผู้วิจัยได้ทำการศึกษาโดยการติดตามเป็นระยะในน้ำหนักตัวและส่วนสูงของเด็กนักเรียนในโรงเรียนชั้นประถมศึกษาในเขตกรุงเทพมหานคร จำนวน 473 คน ในจังหวัดสระบุรี จำนวน 225 คน และในจังหวัดสกลนคร จำนวน 633 คน ตั้งแต่ชั้นประถมศึกษาปีที่ 1 ถึงชั้นประถมศึกษาปีที่ 6 ข้อมูลในชั้นประถมศึกษาปีที่ 1 พบว่า อุบัติการณ์ของโรคอ้วนในเด็กนักเรียนกลุ่มศึกษาจากกรุงเทพมหานคร, สระบุรี และสกลนคร เท่ากับ 16%, 23%, และ 4% ตามลำดับ และเมื่อเด็กกลุ่มนี้อยู่ชั้นประถมศึกษาปีที่ 6 พบว่า มีความชุกของโรคอ้วนเพิ่มขึ้นเป็น 31%, 30% และ 9% ตามลำดับ นอกจากนี้เด็กที่มีน้ำหนักตัวเกินและเด็กที่เป็นโรคอ้วนเมื่อชั้นประถมศึกษาปีที่ 1 จะมีความเสี่ยงในการเป็นโรคอ้วนเมื่อชั้นประถมศึกษาปีที่ 6 ประมาณ 3 และ 5 เท่าในกรุงเทพมหานคร 2 และ 3 เท่าในสระบุรี, 6 และ 12 เท่าในสกลนครตามลำดับ จะเห็นได้ว่าพบความชุกของโรคอ้วนในเด็กนักเรียนชั้นประถมมากขึ้นในกลุ่มที่นำมาศึกษาอย่างน่าตกใจเมื่ออยู่ชั้นประถมศึกษาปีที่ 6