# The Effect of Teacher Education on the Prevalence of Obesity in Kindergarten Children

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***Background:*** *Childhood obesity is increasing worldwide and becoming an important health problem in both the children's current life and their later years. Providing kindergarten teachers with the knowledge should reduce the severity of obesity and prevent childhood obesity.*
***Objective:*** *To monitor the prevalence of over-nutrition and obesity in kindergarten children for 3 years, and to evaluate the effects of teacher education on the prevalence of over-nutrition and obesity.*
***Material and Method:*** *Kindergarten children from 7 schools in Bangkok were enrolled in this cohort study for 3 years (2005-2007). Three school groups were classified according to the number of informed teachers in the school. The children's weight and height were measured yearly using standard instruments. Nutritional status was assessed by% weight for height (%W/H), using the Thai Growth Reference, 1999. After the second measurement, all teachers were informed directly at the schools. The prevalence of over-nutrition and obesity was assessed and compared among the 3 years, and the 3 groups, using Chi-square ($X^2$) test.*
***Results:*** *In the year 2005, 1,232 kindergarten children from 7 schools were enrolled. The prevalence of over-nutrition and obesity was 33% and 17.4% in 2005; 32.8% and 17.2% in 2006; 28.8% and 15.3% in 2007. In the 3rd year, the prevalence of over-nutrition decreased statistically significantly from the first 2 years. The prevalence of over-nutrition and obesity in 3 years decreased insignificantly in each group. This showed the positive effects of the teacher education.*
***Conclusion:*** *Teacher education has effects in reducing the prevalence of over-nutrition and obesity in the kindergarten children.*

***Keywords:*** *Teacher education, Kindergarten children, Over-nutrition, Obesity, Prevalence*

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Obesity is an epidemic disease spreading worldwide and including children. Obesity in childhood is a major public health problem in both developed and developing countries and contributes to significant multiple medical co-morbidities as chronic non-communicable diseases in adulthood[1-3]. Risk factors for childhood obesity include low socioeconomic status, maternal obesity, rapid infancy weight gain, and decreased physical activity[4]. Childhood overweight is one of the most important current public health concerns. The best approach to this problem is prevention of abnormal weight gain. Several strategies for prevention are presented[5]. The targets of obesity prevention should be all children, starting at birth[6,7]. Interventions aimed at childhood obesity include prevention and treatment. The pre-school years may be a critical period for obesity prevention as indicated by the association of the adiposity rebound and obesity in later years[8]. Obesity prevention programs demonstrate that changes in school and community environments can decrease childhood weight gain[4]. So proper management at school level can prevent and reduce the severity of obesity in kindergarten children by promoting lifestyle behaviors and providing proper school lunch, snacks, and physical activity[3,7,9-11].

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Department of Pediatrics, Queen Sirikit National Institute of Child Health, provided the knowledge of how to prevent childhood obesity to the kindergarten teachers, at the beginning of the year 2005. Data from 872 kindergarten children showed that the prevalence of over-nutrition and obesity was 32.5% and 16.4%, respectively[12]. The proper management of kindergarten children at school can reduce the severity of obesity. Providing kindergarten teachers with the knowledge should reduce the severity of obesity and prevent childhood obesity. This study was performed to evaluate the effects of the teacher education on the prevalence of over-nutrition and obesity in the kindergarten schools.

**Objectives**

To monitor the prevalence of over-nutrition and obesity in the kindergarten children for 3 years, and the effects of teacher education on the prevalence of over-nutrition and obesity.

**Material and Method**

Seven schools in Bangkok were enrolled in this cohort study, and classified into 3 groups by teacher education, as follows: group I (no informed teacher), group II (a few informed teachers), and group III (all informed teachers). The weight and height of the kindergarten children in these schools were measured using a standard digital-balance and a standing board, once a year for 3 years, from 2005 to 2007. The nutritional status in the first year was baseline. After the first measurement, all the kindergarten teachers of the schools in group III were informed at Queen Sirikit National Institute of Child Health. The second nutritional status showed the effects of the teacher education in group III. After the second measurement, all teachers were informed and advised directly at the schools. The third measurement was done in the year 2007 and the nutritional status showed the effects of the teacher education in group I-II and long-term effects in group III.

***Statistic analysis***

Nutritional status was assessed by % weight for height (%W/H), using the Thai Growth Reference, 1999[13].%W/H was calculated from actual weight in kilograms divided by median reference weight at the actual height and then multiplying by 100. Over-nutrition, overweight, and obesity were classified by % W/H > 110, > 110-120, and > 120, respectively [14]. The prevalence of over-nutrition and obesity was calculated per 100 children and then compared among the 3 groups in each year for 3 years, and then in each group for 3 years, using the Chi-square ($X^2$) test. P-value < 0.05 means statistically different.

**Results**

In the first year (2005) 1,232 kindergarten children from 7 schools were enrolled. The prevalence of over-nutrition and obesity was 33% and 17.4% in the year 2005; 32.8% and 17.2% in 2006; 28.8% and 15.3% in 2007, respectively in Table 1. The prevalence of over-nutrition decreased statistically significantly from the first 2 years compared to the third year ($p = 0.02$ and $p = 0.03$, respectively), but it decreased insignificantly comparing between the first and second year ($p = 0.9$). The prevalence of over-nutrition decreased only in group III significantly in the year 2006 compared to the other groups ($p = 0.025$) in Table 2. The prevalence of over-nutrition decreased in all groups in the year 2007, but this decrease was insignificant when comparing among 3 groups and in each group ($p > 0.05$). The prevalence of obesity decreased insignificantly in group II and III by the year 2006 and in all groups by the year 2007 in Table 3, but it was not statistically significant among 3 groups and in each group by 3 years ($p > 0.05$).

**Discussion**

This cohort study was conducted by informing the kindergarten teachers of 7 schools at different times and evaluating the effects of the teacher education by monitoring the prevalence of over-nutrition and obesity for 3 years. The prevalence of overweight and obesity in this study were 15.6% and 17.4%, respectively; being slightly higher than the study in Beijing schools which were 14.4% and 13.3%, respectively[15]. The prevalence of over-nutrition decreased slightly in the year 2006 ($p = 0.09$), because in the previous year, the teacher education was provided only to the teachers of group III. This was the same reason that the prevalence of over-nutrition in group III decreased significantly in the year 2006 compared to groups I and II. The prevalence of over-nutrition decreased significantly between the first 2 years and the year 2007, because in the year 2006 the teachers of 7 schools had a chance to be educated directly at their schools after the second measurement and the education of all teachers had a significantly positive effect on decreasing the overweight of the children. Education can lead to the improvement in the food service for pre-school children by resulting in reductions in the dietary intakes of fat

**Table 1.** Prevalence of over-nutrition and obesity in the year 2005-2007

| Year (# students) | Year 2005 (1,232 students) | Year 2006 (1,322 students) | Year 2007 (1,184 students) | p-value |
|---|---|---|---|---|
| Over-nutrition | 33.0% (407) | 32.8% (434) | 28.8% (341) | 0.04* |
| Obesity | 17.4% (214) | 17.2% (228) | 15.3% (181) | 0.30 |

**Table 2.** Prevalence of over-nutrition in the year 2005-2007, comparing among 3 groups

| School group | Year 2005 | Year 2006 | Year 2007 | p-value |
|---|---|---|---|---|
| I | 31.3% (131) | 32.9% (127) | 27.1% (98) | 0.21 |
| II | 35.7% (167) | 36.7% (178) | 31.5% (134) | 0.23 |
| III | 31.5% (109) | 28.4% (128) | 28.9% (115) | 0.6 |
| p-value | 0.3 | 0.025* | 0.39 | |

**Table 3.** Prevalence of obesity in the year 2005-2007, comparing among 3 groups

| School group | Year 2005 | Year 2006 | Year 2007 | p-value |
|---|---|---|---|---|
| I | 16.5% (69) | 18.4% (71) | 16.3% (59) | 0.7 |
| II | 17.9% (84) | 17.3% (84) | 13.9% (59) | 0.96 |
| III | 17.6% (61) | 16.2% (73) | 17.3% (69) | 0.84 |
| p-value | 0.84 | 0.7 | 0.37 | |

and therefore improving weight outcomes[6]. Schools are in a uniquely favorable position to increase physical activity in the curriculum and meet their goals in physical fitness among their students[8,16]. The prevalence of obesity decreased insignificantly in the year 2006 and 2007 because the education had an effect on reducing cases of overweight more than cases of obesity.

Comparing among the 3 groups, the prevalence of over-nutrition and obesity was not different from that in the year 2005, and showed the same baseline of 3 groups as at the beginning. After all the teachers in group III were educated, the prevalence of over-nutrition in group III decreased statistically significantly in the year 2006, compared to the other groups. After the second measurement (2006), the teachers of the schools in group I and II had a chance to be educated directly at their schools, resulting in the insignificantly decreased prevalence of over-nutrition in the year 2007 among 3 groups. However, the prevalence of obesity decreased insignificantly in 3 years, among 3 groups and in each group because treating obese children is much more difficult than preventing overweight. This demonstrates that education alone is less effective than the intervention of dietary control, physical activity, and behavior modification in a weight control program for obese school-aged children[17,18]. Also the longitudinal result was not sustained as that after a simple year-long intervention[9]. The prevalence of overweight and obesity were significantly lower in the intervention schools in Beijing, after the 3-year school-based intervention with nutrition education, physical activity, and parental participation was conducted[15]. Several studies of obesity treatment in children support the use of family-based treatment[7,19]. By serving as role models, parents and other caregivers can help the child develop healthy eating and physical activity habits in order to prevent obesity[7]. Selected prevention in overweight children was most successful when the children were treated together with their parents[20]. Physicians can influence children's habits indirectly by teaching and motivating parents to use their authority effectively[7].

## Conclusion

The teacher education had effects in decreasing the prevalence of over-nutrition significantly and obesity insignificantly in kindergarten children.

**References**

1. Gottesman MM. Healthy eating and activity together (HEAT): weapons against obesity. J Pediatr Health Care 2003; 17: 210-5.
2. Committee on Nutrition American Academy of Pediatrics. Obesity in children. In: Kleinman RE, editor. Pediatric nutrition handbook. 4th ed. Chicago, IL: American Academy of Pediatrics; 1999: 423-58.
3. Krebs NF, Jacobson MS. Prevention of pediatric overweight and obesity. Pediatrics 2003; 112: 424-30.
4. Isganaitis E, Levitsky LL. Preventing childhood obesity: can we do it? Curr Opin Endocrinol Diabetes Obes 2008; 15: 1-8.
5. Daniels SR, Arnett DK, Eckel RH, Gidding SS, Hayman LL, Kumanyika S, et al. Overweight in children and adolescents: pathophysiology, consequences, prevention, and treatment. Circulation 2005; 111: 1999-2012.
6. Swinburn B, Egger G. Preventive strategies against weight gain and obesity. Obes Rev 2002; 3: 289-301.
7. Barlow SE. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. Pediatrics 2007;120 (Suppl 4): S164-92.
8. Flynn MA, McNeil DA, Maloff B, Mutasingwa D, Wu M, Ford C, et al. Reducing obesity and related chronic disease risk in children and youth: a synthesis of evidence with 'best practice' recommendations. Obes Rev 2006; 7(Suppl 1): 7-66.
9. James J, Thomas P, Kerr D. Preventing childhood obesity: two year follow-up results from the Christchurch obesity prevention programme in schools (CHOPPS). BMJ 2007; 335: 762.
10. Lenders CM, Hoppin AG. Evaluation and management of obesity. In: Walker WA, Watkins JB, Duggan C, editors. Nutrition in pediatrics: basic science and clinical applications. London: B.C. Decker; 2003: 917-34.
11. Styne DM. Childhood and adolescent obesity. Prevalence and significance. Pediatr Clin North Am 2001; 48: 823-54.
12. Ratanachu-ek S. Nutritional status of children of 33 kindergarten schools in Bangkok. Thai Pediatr J 2006; 13: 215-7.
13. Working Group for Thai Reference Growth Data. Reference: weight, height, and nutritional status index of Thai people, aged 1 day - 19 years. Nonthaburi: Ministry of Public Health; 1999.
14. Hendricks KM, Duggan C, Walker WA. Manual of pediatric nutrition. 3rd ed. Hamilton: BC Decker; 2000.
15. Jiang J, Xia X, Greiner T, Wu G, Lian G, Rosenqvist U. The effects of a 3-year obesity intervention in schoolchildren in Beijing. Child Care Health Dev 2007; 33: 641-6.
16. American Academy of Pediatrics. Physical fitness and activity in schools. Pediatrics 2000; 105: 1156-7.
17. Sangthien N, Chongviriyaphan N, Taechangam S, Kriengsinyos W, Suthutvoravut U. The effectiveness of the nutrition counseling intervention on weight control program in obese school-aged children [abstract (P5)]. In: The Second Thailand Congress of Nutrition: Sufficiency Nutrition for Happiness; 2007 Oct 3-5; BITEC, Bangkok: 2007: 205.
18. Eliakim A, Nemet D, Balakirski Y, Epstein Y. The effects of nutritional-physical activity school-based intervention on fatness and fitness in preschool children. J Pediatr Endocrinol Metab 2007; 20: 711-8.
19. Nowicka P, Flodmark CE. Family in pediatric obesity management: a literature review. Int J Pediatr Obes 2008 ;3(Suppl 1): 44-50.
20. Muller MJ, Danielzik S, Landsberg B, Pust S. Interventions to prevent overweight in children. Int J Vitam Nutr Res 2006; 76: 225-9.

## ผลของการอบรมครูต่อความชุกของโรคอ้วนในเด็กอนุบาล

*สุนทรี รัตนชูเอก, ปราณี เมืองน้อย*

***ความเป็นมา:*** *โรคอ้วนในเด็กมีการระบาดมากขึ้นทั่วโลก เป็นปัญหาสุขภาพที่สำคัญในปัจจุบัน การดูแลเด็กอนุบาลที่โรงเรียนอย่างเหมาะสมสามารถลดความรุนแรงของโรคอ้วนลงได้ การให้ความรู้แก่ครูอนุบาลน่าจะลดความรุนแรงและป้องกันโรคอ้วนในเด็กอนุบาลได้*

***วัตถุประสงค์:*** *เพื่อติดตามความชุกของภาวะโภชนาการเกินและโรคอ้วนในเด็กอนุบาล และประเมิน ผลของการอบรมให้ความรู้แก่ครูอนุบาลต่อความชุกของภาวะโภชนาการเกินและโรคอ้วน*

***วัสดุและวิธีการ:*** *เด็กอนุบาลของโรงเรียน 7 แห่งในกรุงเทพฯ เข้าร่วมการศึกษาต่อเนื่อง 3 ปี (พ.ศ. 2548-2550) แบบ prospective แบ่งโรงเรียนเป็น 3 กลุ่ม ตามจำนวนครูอนุบาลในโรงเรียนที่ได้รับการอบรม–ติดตามชั่งน้ำหนักและวัดส่วนสูงทุกปี ๆ ละครั้ง โดยใช้เครื่องมือมาตรฐาน ประเมินภาวะโภชนาการโดยใช้ค่าร้อยละของน้ำหนักตัวตามความสูง เปรียบเทียบกับเกณฑ์อ้างอิงการเจริญเติบโตของเด็กไทยปี พ.ศ. 2542 หลังการชั่งน้ำหนักครั้งที่สอง คุณครูอนุบาลทุกคนจะได้รับความรู้และคำแนะนำที่โรงเรียนในการดูแลและป้องกันโรคอ้วน ความชุกของภาวะโภชนาการเกินและโรคอ้วนถูกประเมิน และเปรียบเทียบระหว่าง 3 ปี และ 3 กลุ่มโรงเรียน โดยใช้ Chi-square test*

***ผลการศึกษา:*** *ในปี พ.ศ. 2548 เด็กอนุบาลของโรงเรียน 7 แห่ง ในกรุงเทพ จำนวน 1,232 คนเข้าร่วมในการศึกษา พบความชุกของภาวะโภชนาการเกินและโรคอ้วนร้อยละ 33 และ 17.4 ในปี พ.ศ. 2548, ร้อยละ 32.8 และ 17.2 ในปี พ.ศ. 2549, และร้อยละ 28.8 และ 15.3 ในปี พ.ศ. 2550 ตามลำดับ ในปีที่ 3 พบว่า ภาวะโภชนาการเกินลดลงอย่างมีนัยสำคัญทางสถิติเปรียบเทียบระหว่าง 2 ปีแรก ความชุกของภาวะโภชนาการเกินและโรคอ้วนลดลงใน 3 ปี แต่ไม่มีนัยสำคัญทางสถิติในแต่ละกลุ่มในโรงเรียนกลุ่ม 3 พบว่าลดลงอย่างมีนัยสำคัญในปี พ.ศ. 2549 เมื่อ เปรียบเทียบกับกลุ่มอื่น เป็นการแสดงผลของการอบรมครู ความชุกของภาวะโภชนาการเกินลดลงทุกกลุ่มโรงเรียนในปี พ.ศ. 2550 และความชุกของโรคอ้วนลดลงใน 3 ปี แต่ไม่มีนัยสำคัญทางสถิติ ระหว่างโรงเรียน 3 กลุ่ม และในแต่ละกลุ่ม*

***สรุป:*** *การอบรมให้ความรู้แก่ครูอนุบาลมีผลต่อการลดความชุกของภาวะโภชนาการเกินและโรคอ้วนในเด็กอนุบาล*