

Risk factors for obesity in 6 to 12-year-old children

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Abstract

Background The causes of obesity in children are multifactorial, including genetics, physiology, metabolism, psychology, socioeconomic status, lifestyle, and culture.

Objective To assess for relationships between obesity in 6 to 12-year-old children and maternal nutritional status, maternal education, eating breakfast, eating fast food, physical activity, TV watching, and playing video games.

Methods This case-control study included students of Sejahtera Public School aged 6 to 12 years. Questionnaires were distributed to their parents for data on maternal education, eating breakfast, eating fast food, physical activity, TV watching and playing video games. Maternal nutritional status was assessed by one of the researchers. Univariate analysis with Chi-square test was used to assess every risk factor. Those with a P value of <0.25 were subjected to multivariate analysis, performed using multiple logistic regression analysis.

Results From June to July 2013, 60 obese children and 60 well-nourished children, as a control group, were enrolled in the study. Obese mothers tended to have obese children [odds ratio/OR 252.48; 95%CI 33.4 to 1908.4]. Children who ate fast food 6–8 times/week, had low physical activity, and watched TV more than 8 hours/week had significantly higher risk for obesity [OR 12.94, 95%CI 1.7 to 100.7; and OR 266.94, 95% CI 7.8 to 9137.7; OR 21.44, 95%CI 2.68 to 171.61; respectively]. Maternal education, eating breakfast, and playing video games were not significant risk factors for childhood obesity.

Conclusion Maternal obesity, eating fast food 6–8 times per week, low physical activity and watching TV more than 8 hours/week are risk factors for childhood obesity. [Paediatr Indones. 2015;55:35–9].

Keywords: fast food, maternal nutritional status, watching TV, obesity, physical activity

Obesity is a health problem in both developed and developing countries.^{1,2} Lately, the prevalence of obesity in children has markedly increased in Indonesia.³ Obese children have been found to have an increased risk for cardiovascular diseases, hypertension, hyperinsulinism, infertility and type II diabetes.^{4,5} Moreover, obesity in children is predictive of obesity in adulthood.⁶

The causes of obesity in children are multifactorial, including genetics, physiology, metabolism, psychology, socioeconomic status, lifestyle, and culture. In the family, the mother plays an important role in her children's nutritional status. Maternal obesity and higher levels of education tend to increase the risk of childhood obesity.^{7,8} A lifestyle marked by consuming high calorie-dense foods, skipping breakfast, and lack of physical activity, together with advancements in technology, has led to children spending most of their time indoors playing video games and watching TV. These factors have been associated with childhood obesity.^{9–11} The aim of this study was to assess for relationships between obesity in children aged 6 to 12 years and maternal nutritional status, maternal education, eating breakfast, eating

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fast food, physical activity, TV watching, and playing video games.

Methods

This case-control study was performed from June to July 2013. Subjects were students of Sejahtera Public School in Bandung who met the following inclusion criteria: (1) healthy children aged 6 to 12 years, (2) fulfilled the WHO MGRS 2007 criteria for childhood obesity (BMI/age > 3SD)¹² (obese group) or were well-nourished (control group), (3) parental education were at least Junior high school graduate. We excluded children with chronic illness and those who did not fill the questionnaires properly. Obesity was defined as BMI for age > +3 SD, while well-nourished status was defined as between +2SD and -2SD, according to WHO-MGRS 2007.¹² Obese children were randomly recruited as case subjects and well-nourished children were recruited as control subjects, with age-matching. This study was approved by the Ethics Committee of the Faculty of Medicine at the University of Padjajaran. Parents or children’s legal guardians gave written consent for participation. All data regarding maternal education, eating breakfast, eating fast food, physical activity, TV watching and playing video games were collected by questionnaires filled by parents. Maternal nutritional status was determined by the researcher. Univariate analysis with Chi-square test was performed on potential risk factors and those with P values <0.25 were subjected to a multivariate analysis with multiple logistic regression. Data analysis was performed with SPSS ver.18 software, with 95% confidence intervals and P values ≤ 0.05 considered to be statistically significant.

Results

In this study, 603 students were eligible for enrollment, 8 of whom refused to participate. A further 35 students were excluded because they did not fill the questionnaires. We enrolled a total of 120 children who fulfilled the inclusion criteria, 60 obese and 60 well-nourished children. The study design flow chart is shown in Figure 1. Subjects’ characteristics are shown in Table 1.

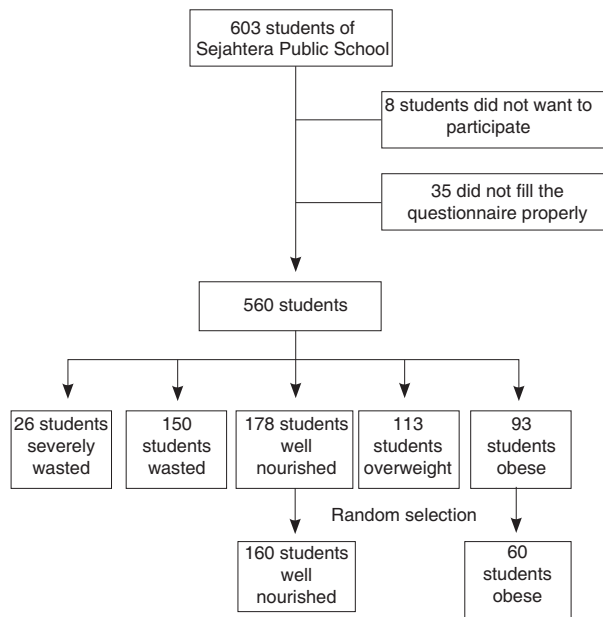


Figure 1. Study flow chart

Table 1. Subjects’ characteristics

Characteristics	Nutritional status	
	Well-nourished (N=60)	Obese (N=60)
Gender, n (%)		
Male	31 (52)	38 (63)
Female	29 (48)	22 (37)
Mean age, years (SD)	9 (1.7)	9 (1.7)
Race, n (%)		
Sundanese	50 (83)	53 (88)
Javanese	10 (17)	7 (12)

Low maternal education, eating breakfast, and playing games > 8 hours per week were not risk factors for childhood obesity. However, univariate analysis revealed that obese maternal nutritional status, eating fast food 6-8 times per week, exercising fewer than 3 days per week, and watching TV more than 8 hours per week were significantly higher in the obese group. Factors related to children’s nutritional status are shown in Table 2.

A multivariate analysis revealed that obese maternal nutritional status, eating fast food 6-8 times per week, lack of physical activity (exercising <3 days/week), and watching TV more than 8 hours per week were significant risk factors for childhood obesity. The multiple logistic regression results are shown in Table 3.

Table 2. Factors related to children's nutritional status by univariate analysis

Characteristics	Children nutritional status		P value
	Well-nourished N=60	Obese N=60	
Maternal education, n (%)			
Senior high school	33 (55)	15 (25)	0.233
Undergraduate	27 (45)	45 (75)	
Maternal nutritional status, n (%)			
Normal	53 (88)	13 (22)	<0.001
Obese	7 (12)	47 (78)	
Eating breakfast, n (%)			
Yes	21 (35)	40 (67)	0.900
No	39 (65)	20 (33)	
Eating fast food, n (%)			
2–5 times/week	51 (85)	32 (53)	0.035
6–8 times/week	9 (15)	28 (47)	
Exercise, n (%)			
1–2 days/week	51 (85)	58(97)	0.017
3–4 days/week	9 (15)	2 (3)	
Watch TV, n (%)			
≤ 8 hrs/week	56 (94)	41 (68)	0.007
>8 hrs/week	4 (6)	19 (32)	
Playing video games, n (%)			
≤ 8 hrs/week	50 (83)	23 (38)	0.106
>8 hrs/week	10 (17)	37 (62)	

Note: P value based on Chi-square test (χ^2)

Table 3. Multiple logistic regression results on factors related to childhood obesity

Variables	OR (95%CI)	P value
Obese maternal nutritional status	252.48 (33.4 to 1908.4)	<0.001
Eating fast food 6-8 times/wk	12.94 (1.7 to 100.7)	0.014
Exercise <3d/week	266.94 (7.8 to 9137.7)	0.002
Watching TV more than 8 hr/wk	21.44 (2.68 to 171.61)	0.004

Note: OR=odds ratio

Discussion

We found that obese maternal nutritional status, eating fast food 6-8 times per week, lack of physical activity (exercising <3 days/week), and watching TV more than 8 hours/week were significant risk factors for childhood obesity. Previous studies reported that children of obese parents have a higher risk of obesity. If both parents are obese, they were reported to have a 30–40% risk of their children being obese. However, when both parents were not obese, the risk was only 14%.^{9,13} In our study, maternal obesity increased the risk of obesity in children by 252 times (OR 252.48; 95%CI 33.4 to 2908.4). Whitaker *et al.*¹⁴ reported that

parental obesity doubled the risk of obesity in children under 10 years of age, in a retrospective cohort study. Lazzeri *et al.*¹⁵ showed that maternal obesity increased the risk of childhood obesity by 6 times compared with normal weight mothers, in Italian children aged 8 to 9 years.

Children's eating habits also determine their nutritional status. Children who consume fast food rich in carbohydrates and fat have a positive energy balance, and thus increasing the risk of obesity. In our study, children who ate fast food 6 to 8 times/week had a 12 times increased risk of obesity (OR 12.94; 95%CI 1.7 to 100.7). Previous studies on children's eating behavior were done in the US. A North Carolina study

on children aged 2 to 18 years showed that children who ate fast food doubled their risk of obesity.¹⁶ Also, a Boston study on children aged 2 to 7 years showed that children who ate fast food more than once per week increased their risk of obesity by 17 times.¹⁷

Other pertinent childhood obesity risk factors were duration of TV watching and lack of physical activity. Due to technology advancements and changes in lifestyle, more children spend their time indoors watching TV which leads to low physical activity.^{9,10} *The American Academy of Pediatrics* recommended TV viewing duration of less than 2 hours per day.¹⁸ In our study, children who watched TV more than 8 hours/week increased their risk of obesity by 21 times (OR 21.44; 95%CI 2.68 to 171.61) and children with low physical activity increased their risk of obesity by 266 times (OR 266.94; 95%CI 7.8 to 9137.7). Al-Ghamdi in Saudi Arabia found that 9 to 14-year-old children who watched TV more than 3 hours/day during weekends increased their risk of obesity by 1.25.¹⁹ Kriemler *et al.* also reported that children aged 6 to 12 years with low physical activity had an 8 times higher risk of developing obesity.²⁰

A limitation of this study was that subjects were taken from a single public school in Bandung, hence, the sample may not have been representative of all school-aged children. Also, the use of questionnaires to gather information from parents may have been subject to recall bias.

In conclusion, obese maternal nutritional status, eating fast food 6-8 times per week, low physical activity (exercise < 3 days per week) and watching TV more than 8 hours/week are risk factors for childhood obesity.

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