

Factors Related to Overweight in Kindergarten School Children

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Abstract

Obesity has become a significant public health problem of the twenty first century. An increasing number of preschool children are becoming overweight. Although many risk factors have been identified for school-age children, less is known about this young age group. This study was aimed to determine factors associated with overweight among preschool children. Study design was a cross sectional survey. Sample in this study was 90 children aged 3–6 years old in Bina Putik Kindergarten School in Cempaka Putih District (total sampling). The prevalence of overweight and obesity in this sample were 24.4% and 13.3% respectively. There were significant relationships between overweight and some variables using chi-square test such as: age of the children, having overweight parents, nutritional knowledge of the mother, duration of breast feeding, frequency of fast food consumption ($p < 0.05$). In Cox Regression analysis, only the age of children and nutritional knowledge of mothers were found as determinant factors influencing childhood overweight after adjusting other variables. Younger aged children (<5 years) had a greater risk of being overweight than older children (>5 years old). It could be concluded that mother's knowledge on nutrition played an important role in preventing overweight children. Suggested recommendation in order to prevent overweight since childhood was by increasing mother's knowledge through optimizing relevant programs in the Puskesmas.

Abstrak

Faktor-faktor yang Berhubungan dengan Kelebihan Berat Badan pada Anak Usia Taman Kanak Kanak. Obesitas menjadi masalah kesehatan umum yang signifikan dari abad kedua puluh. Nampak terjadi peningkatan jumlah anak-anak prasekolah yang memiliki kelebihan berat badan. Walaupun telah banyak diidentifikasi faktor risiko yang ada untuk anak-anak usia sekolah, masih sedikit yang diketahui tentang kelompok usia muda ini. Penelitian ini bertujuan untuk menentukan faktor-faktor yang terkait dengan kelebihan berat badan di kalangan anak-anak prasekolah. Model penelitian ini adalah melalui survei penampang silang. Sampel dalam studi ini adalah 90 anak berusia 3 sampai 6 tahun di Taman Kanak Kanak Bina Putik di daerah Cempaka Putih (total sampel). Prevalensi kegemukan dan obesitas dalam contoh ini masing-masing adalah 24,4% dan 13,3%. Ada hubungan yang signifikan antara kelebihan berat badan dan beberapa variabel yang menggunakan tes Chi-kuadrat seperti: usia anak-anak, memiliki orangtua yang kelebihan berat badan, pengetahuan ibu tentang gizi, durasi menyusui, frekuensi konsumsi makanan cepat saji ($p < 0,05$). Dalam analisis regresi Cox, hanya usia anak dan pengetahuan gizi ibu ditemukan sebagai faktor-faktor penentu yang mempengaruhi anak-anak yang kelebihan berat badan setelah menyesuaikan variabel-variabel lainnya. Anak-anak usia muda (<5 tahun) memiliki risiko yang lebih besar daripada anak-anak lebih tua (>5 tahun). Dapat disimpulkan bahwa pengetahuan ibu tentang gizi memainkan peranan penting dalam mencegah anak-anak kelebihan berat badan. Rekomendasi yang disarankan untuk mencegah kelebihan berat badan sejak masa kanak-kanak adalah dengan meningkatkan pengetahuan ibu melalui optimalisasi program-program yang terkait di Puskesmas.

Keywords: age of children, mother's knowledge on nutrition, overweight, preschool children

Introduction

Childhood obesity until now becomes a significant public health problem, not only in developed countries but also in developing countries. Its prevalence has increased over the last few decades.¹⁻² Childhood

obesity had been more than doubled in children and tripled in adolescents in the past 30 years.²⁻³ In year 2010, more than one third of children and adolescents were overweight or obese.² In Indonesia the prevalence of overweight in children aged 3–6 aged years old has also increased dramatically. In 2004 the prevalence was

3.5% and then increased to be 12.2% in 2007.⁴ In 2010 the prevalence of overweight in Indonesia was 14.0%.⁵ A study by Hilma (2004) in kindergarten school in Jakarta Timur showed the prevalence of overweight was 26.6%.⁶ Child risk of obesity was found to be influenced by parental characteristics (such as parental weight status, nutrition education and educational attainment), parenting practices (such as parent encouragement, role modeling, rules, practices, the types of foods available within the household), income and socio economic status.⁷⁻⁹

Overweight and obesity in childhood are associated with substantial social and psychosocial consequences such as stigmatization, poor self-esteem as well as the increase cardiovascular disease risk, type 2 diabetes, stroke, several types of cancer, osteoarthritis,^{3-5,10-12} and sleep apnea.¹³ Children and adolescents who are obese are likely to be obese as adults.^{12,14-15}

Many studies have demonstrated that children's diets are often high in fat and calories and are low in nutrient-rich, fruits and vegetables. Moreover, children are more likely to spend more time on watching television, meaning less physical activities. All these are related to parent's attitudes on diet and knowledge on nutrition.¹⁶ Therefore, knowing early prevention of overweight has emerged to be a crucial strategy to reduce associated short and long-term morbidities. Thus, it is important to conduct a survey in order to know what factors are dominant related to overweight or obesity in preschool children. The aim of this study is to examine the relationships between socio demographic factors, parent's education and knowledge on nutrition, feeding practice including breast feeding duration and lifestyle social factors (such as fast food consumption and eating habit while watching television and physical activity), and preschool-aged overweight. These findings may assist health care providers in directing strategies to promote life long healthy diets.

Methods

The cross sectional study was done in Bina putik Kindergarten in Cempaka Putih, Jakarta Pusat in April 2010. Based on Puskesmas Cempaka Putih's screening data in 2008, the prevalence of overweight in Bina Putik's Kindergarten (Taman Kanak Kanak Bina Putik) was as high as 29.3%. The minimum sample based on calculation was 43 children, however this study used total sample which was 90 children aged 3–6 years. Agreement to participate in the survey was obtained from each mother. The main outcomes were the prevalence of overweight in preschool children and dominant determinant factors related to overweight children.

The weight of the child was measured directly using a calibrated light weight, bathroom-type scales with a

digital screen designed in light clothing and without shoes with 0.1 kg of precision. Nutritional status of children was categorized as overweight (including obese child) and not overweight (including normal weight and underweight). Each subject was measured while wearing light clothing without shoes or stockings. The World Health Organization 2006 growth reference standard was used to transform children's weight sex- and age-specific Z-scores: weight-for-age Z-score (WAZ).¹⁷

A structured questionnaire was used to get information from the mothers about their children such as age, sex, breastfeeding duration, frequency of fast food consumption, and time spent of watching television. Information on parental characteristics (education, mother's knowledge about nutrition) were collected from 90 mothers. The questions on nutritional knowledge included: characteristics of nutritious foods, the usefulness of food for health, sources of nutrients carbohydrate, protein, fat, vitamin and minerals, mother's opinion about healthiness of obese children, causes of obesity in children, how to prevent obesity in children. The questions about children included: 1) duration of breastfeeding. The following breastfeeding duration categories were then created: <6 months and ≥6 months. Breastfeeding duration, as used here, represents any kind of breastfeeding and not only exclusive breastfeeding; 2) frequency of fast food consumption, 3) time spent of watching TV every day, 4) frequency of exercise every week. Data was analyzed using Chi-Square and Cox regression analysis.

Results and Discussion

Age distributions of the children were 23.3% of 3 years, 40% of 4 years and 36.7% of 5–6 years. Sex was almost equally distributed among boys and girls (46.7 boys and 53.3% girls). The result showed that the prevalence of overweight was 37.7% which consisted of overweight 24.4% and obesity 13.3%. The prevalence of overweight children was higher than it was reported in National Basic Health Survey 2010 (the prevalence of overweight in Indonesia and in Daerah Khusus Ibukota (DKI) Jakarta were 5.8% and 11.1% respectively) 5, because this survey used much smaller sample size by purposive sampling method and encompassed a population that differed greatly by socioeconomic status. In this study the families came from high social economic status. Similarly, quite high prevalence results were found by Damayanti *et al.* as quoted by Lidia Marpaung, showing that prevalence of overweight in Jakarta, Semarang, and Medan within the periode 2002-2005 were 25%, 24.3% and 17.75% respectively.¹⁸ Hilma (2004) also found the prevalence of overweight was 26.6% in kindergarten school in East Jakarta.⁶ The increasing of prevalence was because many people in our community often do not realize obese as a disease

but rather a symbol of prosperity. Mothers are often proud that their children are overweight/obese and they think that the children are healthy. Obese children tend to become obese adults.¹⁵

The prevalence of overweight was higher among younger children (aged 3–5 years) as compared to older children (47.4% vs 21.2%). Riyanti (2002) found similar result that overweight was higher in younger age (≤6 years old) although the result was not significant.¹⁹ Obesity may occur at any age but is more frequent in the first year of life, i.e. age 3-6 years and early adolescence.¹³ It is found in this study that children aged less than 5 years old were 2.5 times risk being overweight as compared to children aged 5–6 years.

There was 53.3% overweight parents, and 70.8% among them were having overweight children. The result showed that all overweight children were from overweight/obese families. Arluk *et al.* (2003) found obese mother was the strongest independent predictor of childhood obesity.²⁰ According to Garrow (2000) genetic factor was stronger influence than environment factors in child’s overweight.²¹ But other studies stated inversely that environmental factors seem to play major role in the rising prevalence of obesity worldwide.²²

As shown in table 1 that not overweight and overweight children were similarly distributed with respect to overweight parents, sex, mother’s formal education, breastfeeding duration, fast food consumption, time spent watching television, and physical activity. Duration of breast feeding was related to status of overweight. In this study, all overweight children were breastfed less than 6 months. In another word, all children got breast feeding at least 6 months were not overweight. This finding was consistent with study by Grummer – Strawn and Zugou. They found that breastfeeding was associated with a reduced obesity risk at age of 4 years only when breast feeding continued >6 months.²³ Bogen, Hanusa and Whitaker got result from their study that the reduction in obesity risk occurred only for children who were breastfed at least 16 weeks without formula or at least 26 weeks with concurrent formula.²⁴ Other studies found that there was an inverse dose dependent relationship between breastfeeding and obesity.^{23,25-27} As stated by Von Kries *et al.* and Gusti Lestari Handayani (2007) it seems logical to think breast feeding as a prevention of obesity.^{26,28} In Canada the prevalences of obesity on pre school children were 4.5% in unbreastfed children and 2.8% on breastfed children.²⁶

Table 1. Factors Related to Overweight in Children Aged 3–6 Years

Covariates Variables	Nutritional Status				Crude Relative Risk	95% Confidence Interval	P
	Not Overweight (n=56)		Overweight (n=34)				
	n	%	n	%			
Overweight parents							
No	42	100	0	0	1.00		
Yes	14	29.2	34	70.8	N/A*		
Sex							
Girls	33	68.8	15	31.2	1.00	Reference	
Boys	23	54.8	19	45.2	1.45	0.85–2.47	0.172
Mother’s Formal Education							
>9 years	44	61.1	28	38.9	1.00	Reference	
≤9 years	12	66.7	6	33.3	0.86	0.42–1.75	0.664
Breast Feeding Duration							
≥6 Months	44	100	0	0	1.00		
<6 Months	12	26.1	34	73.9	N/A*		
Fast Food Consumption							
Not Often (<3 times/week)	18	100	0	0	1.00		
Often (≥3 times/week)	38	52.8	34	47.2	N/A*		
Watching Television							
Not Often (<3 times/day)	17	60.7	11	39.3	1.00	Reference	
Often (≥3 times/day)	39	62.9	23	37.1	0.94	0.54–1.66	0.843
Physical Activity							
Medium – Heavy	20	62.5	12	37.5	1.00	Reference	
Light	36	62.1	22	37.9	1.01	0.58–1.76	0.968

*N/A = Not applicable

Table 2. Determinant Factors of Overweight in Children Aged 3–6 Years

Covariates Variables	Nutritional Status				Adjusted Relative Risk	95% Confidence Interval	p
	Not Overweight (n=56)		Overweight (n=34)				
	n	%	n	%			
Children's Age							
5–6 years	26	78.8	7	1.2	1.00	Reference	
3–4 years	30	52.6	27	7.4	2.50	1.09–5.75	0.031
Mother's Knowledge on Nutrition							
Good	44	81.5	10	8.5	1.00	Reference	
Poor	12	33.3	24	6.7	3.84	1.83–8.04	0.000

Fast food consumption was significantly related to overweight. Widiastuti (2001) found that fast food consumption ≥ 3 times/week would cause overweight.²⁹ Dharmawan (2001) also found that more obese children in those consumed food ≥ 2 times/week as compared to those consumed fast food 1 times/week. Fast food consumption was directly associated with greater total energy intake and greater percentage of energy from fat than those who did not consuming fast food during one week time period. Fast food consumption was associated with a lower daily intake of fruit and vegetables and might adversely affect the quality of dietary intake.³⁰

Another important influence on the types of food young children consume is household's food choices. At an early age children will eat what their parents, especially their mothers eat and if parents overeat, their children may too. Thus the parents' own eating behaviors may contribute to the development of overweight in their children.³¹ The types of food available and accessible in home are also linked with the weight status of preschool children. Research suggests, for example, that increased consumption of sugar sweetened drinks, like fruit juice, might raise the risk of overweight among preschool children.³²

Nearly 70% of children (62 out of 90) used to watch television ≥ 3 hours per day. The relationship between time spent watching television and overweight was still controversy. Some studies found no relationship including this study as also Dharmawan's study in 2001.³⁰ Other studies found significant relationships. Sedentary behaviors like watching television and playing computer games were associated with increased prevalence of obesity.^{20,22} TV viewing may increase overweight both by reducing children's physical activity and by encouraging poor eating habits in children.

Physical activity was not related to overweight as found in this study and other studies.^{20,30,33} Other research found that physical activity was associated with lower risks of accelerated weight gain and excess adiposity among preschool-aged children.³⁴ In this study the method of data collection of physical activity pattern

was based on an interval level variable children spent time for physical activity as mothers reported. Future research in this area would need more accurate elaboration from physical activity recall such as include type, duration and intensity of physical activity. Physical activity is a key component of energy balance, and keeping small children active is an essential part of preventing child overweight.³⁵

Table 2 showed that low maternal knowledge on nutrition and younger child's age were risk factors of child overweight and obesity after adjusting for sex, education, breastfeeding duration, fast food consumption, watching television and physical activity with relative risk for these variables were 2.50 and 3.84 respectively. Despite its limitation, this study proved that the importance of parent's knowledge on nutrition in preventing their children from overweight/obesity is in conjunction with other studies.

Parents' influence is thought to be the strongest factor affecting children's diets especially during early childhood. Parents act as providers, enforcers and role models. Parents are the primary role models of preschool children. Exploring parents' dietary beliefs and behaviors may be important in determining whether these factors influence young children's weight.^{14,36-37}

Conclusions

The prevalence of overweight was very high in kindergarten school (37.7%). Overweight and obese children were from obese families, having an overweight parents, (100%). Determinant factors of overweight in Children aged 3–6 years were children's age and mother's knowledge on nutrition after adjusting other variables.

Parents play a critical role at home in preventing childhood obesity, with their role change at different stages of their child's development. Bringing about better understanding of their own role in influencing their child's dietary practices, physical activity, sedentary behaviors, and ultimately weight status, parents can learn how to create a healthy nutrition environment in

their home, provide opportunities for physical activity and discourage sedentary behaviors such as TV viewing. Therefore, parents are the primary influence and role models for children and parents' diet-related attitude and knowledge provide the most significant influence for young children.

Health professionals should target parents of children at risk of overweight/obesity with focused on strategies to help children to change the types of foods consumed and to reduce the time spent on television. A concomitant decrease in total dietary energy and modifications of other lifestyle factors, such as physical activity, also need to be emphasized.

References

- World Health Organization. *Obesity: Preventing and managing the global epidemic*. Geneva: World Health Organization, 2000.
- Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *J Am Med Assoc*. 2012;307(5):483-490.
- National Center for Health Statistics. *Health, United States, 2011: With special features on socio economic status and health*. United States: Department of Health and Human Services, 2012.
- National Institute for Health Research and Development. *Final report of national basic health research 2007 (RISKESDAS 2007)*. Jakarta: Ministry of Health Republic of Indonesia, 2008.
- National Institute for Health Research and Development. *Final report of national basic health research 2010 (RISKESDAS 2010)*. Jakarta: Ministry of Health Republic of Indonesia, 2010.
- Hilma I. *Hubungan antara kebiasaan makan dan aktifitas fisik dengan kejadian obesitas pada anak prasekolah di TK DONBOSCO II Pulo Mas Jakarta Timur* [Skripsi]. Indonesia: FKM Universitas Indonesia; 2004.
- Gable S, Lutz S. Household, parent, and child contributions to childhood obesity. *Fam Relations*. 2000;49:293-300.
- Davison KK, Birch LL. Obesigenic families: parents' physical activity and dietary intake patterns predict girls' risk of overweight. *Int J Obes*. 2002;26:1186-1193.
- Campbell K, Crawford D, Ball K. Family food environment and dietary behaviors likely to promote fatness in 5-6 year-old children. *Int J Obes*. 2006;30:1272-1280.
- de Onis M, Monika B, Elaine B. Global prevalence and trends of overweight and obesity among preschool children *Am J Clin Nutr*. 2010;92:1257-1264.
- Dietz WH. Overweight in childhood and adolescence. *N Engl J Med*. 2004;350:855-857.
- Freedman DS, Kettel L, Serdula MK, Dietz WH, Srinivasan SR, Berenson GS. The relation of childhood BMI to adult adiposity: The Bogalusa Heart Study. *Pediatrics*. 2005;115:22-27.
- Dietz WH, Gortmaker SL. Do we fatten our children at the TV set? Television viewing and obesity in children and adolescent. *Pediatrics*. 2001;75:807-812.
- Wardle J, Carnell S, Cooke L. Parental control over feeding and children's fruit and vegetable intake: how are they related? *J Am Diet Assoc*. 2005; 105(2):227-232.
- Lobstein T, Baur L, Uauy R. Taskforce IIO: Obesity in children and young people: a crisis in public health. *Obes Rev*. 2004;5(1):4-85.
- Campbell K, Hesketh K, Crawford D, Salmon J, Ball K, McCallum Z. The infant feeding activity and nutrition trial (INFANT) an early intervention to prevent childhood obesity: Cluster-randomized controlled trial. *BMC Public Health*. 2008;8:103.
- World Health Organization. *Physical status, the use and interpretation of anthropometry. World Health Organization technical report series 2007.854*. Geneva: World Health Organization, 2007.
- Marpaung L. *Perilaku Ibu terhadap Obesitas pada Anak Usia Sekolah Dasar Pertiwi Kecamatan Medan Barat Tahun 2007* [Skripsi]. Indonesia: Fakultas Kesehatan Masyarakat Universitas Sumatera Utara; 2009 .
- Riyanti A. *Riwayat pemberian ASI dan faktor-faktor lain yang berhubungan dengan status gizi anak pra sekolah di Taman Kanak-Kanak Islam (TKI) Al Azhar Kemang Jakarta Selatan tahun 2002* [Skripsi]. Indonesia: FKM Universitas Indonesia; 2002.
- Arluk SL, Branch JD, Swain DP, Dowling EA. Childhood obesity's relationship to time spent in sedentary behavior. *Military Med*. 2003;168(7):583-586.
- Garrow JS. *Obesity in: Human nutrition and dietetics*. 10th ed. London: Elsevier Churchill Livingstone; 2000.
- Dehghan M, Akhtar-Danesh N, Merchant AT. Childhood obesity, prevalence and prevention. *Nutr. J*. 2005;4:24.
- Grummer SLM, Zugno M. Does breast feeding protect against pediatric overweight? Analysis of longitudinal data from the centers for disease control and prevention. Pediatric nutrition surveillance system. *Pediatrics*. 2004;113:e81-86.
- Bogen DL, Hanusa BH, Whitaker RC. The effect of Breast-feeding with and without formula use on the risk of obesity at 4 years of age. *Obes Res*. 2004;12(9):1527-1535.
- Gillman MW, Rifas-Shiman SL, Camargo CA, Berkey CS, Frazier A, Rocket R, et al. Risk of overweight among aolescnts who were breastfed as infants. *JAMA*. 2001;285:2461-2467.
- von Kries R, Koletzko B, Sauerwald T, von Mutius E, Barnert D, Grunert V, et al. Breast feeding and obesity: Cross sectional study. *Br Med J*. 1999;319: 147-150.
- Hawkins SS, Law CL. A review of risk factors for overweight in preschool children: a policy perspective. *Int J Pediatr Obes*. 2006;1:195-209.
- Handayani GL. *Durasi pemberian ASI dan risiko terjadinya dan obesitas pada anak usia pra-sekolah di Kabupaten Purworejo, tahun 2007* [Tesis]. Indonesia: FKM Universitas Gadjah Mada; 2007.
- Widiastuti R. *Kandungan gizi fast food*, Jakarta: YLKI, 2001.
- Dharmawan A. *Perbandingan kejadian gizi lebih antara anak taman kanak-kanak Islam Al-Hidayah Kelapa Gading Jakarta Utara dengan anak Taman Kanak-kanak Islam Al-Fikroh Pondok Ungu Permai Bekasi* [Skripsi]. Indonesia: FKM Universitas Indonesia; 2001.
- Oliveria SA, Ellison RC, Moore LL. Parent-child relationships in nutrient intake: the Framingham Children's Study. *Am J Clin Nutr*. 1992;56:593-598.

32. Dennison BS, Rockwell HL, Baker SL. Excess fruit juice consumption by preschool-aged children is associated with short stature and obesity. *Pediatrics*. 1997;99(1):15-22.
33. Marbun R. *Hubungan konsumsi makan, kebiasaan jajan dan pola aktivitas fisik dengan status gizi siswa: suatu studi di SD Santa Maria Jakarta Timur* [Tesis]. Indonesia: Program Pasca Sarjana FKM UI, 2002.
34. Klesges RCK, Lisa M. A longitudinal analysis of accelerated weight gain in preschool children. *Pediatrics*. 1995;95(1):126-130.
35. Kohl III HW, Hobbs KE. Development of physical activity behaviors among children and adolescents. *Pediatrics*. 1998;101(3):549-554.
36. McCaffree J. Childhood eating patterns: The roles parents play. *J Am Diet Assoc*. 2003;103(12):1587.
37. Lindsay AC, Sussner KM, Kim J, Gortmaker SL. The role of Parents in preventing childhood obesity. *The Future of Children*. 2006;16(1):169-186.