

Review Article

Impact of breakfast skipping toward children health: a review

Hasanuddin Nuru^{1,2,3,4*}, Fardiana Mamang²

¹Lecturer at Faculty of Health Science, University of Islam Makassar, Makassar, Indonesia

²Lecturer at Nursing and Midwifery Program School of Nursing STIK-GIA Makassar

³Emergency Nursing Practitioner at District DAYA Hospital, Makassar, Indonesia

⁴PhD Student at Faculty of Nursing, Mahidol University, Thailand

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*Correspondence:

Hasanuddin Nuru,

E-mail: hasanuddinmu@gmail.com

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ABSTRACT

Breakfast skip is an activity that ignores the meal in the morning before start works, most previous studies assumed that it's affect children health outcome. This study aim to inform the readers that how breakfast skip influence adolescent health status particularly weigh gain. This data was collected from published papers between January 2008 to 2014 used Google scholar databases. The articles were limited to English language only which focus on breakfast skip, obesity and children as keywords. Breakfast skipping has great influence to the children body particularly body mass index (BMI). Those who omit breakfast will less satiety, increase appetite and having large portion at subsequent meals, consequently total energy density higher than breakfast eaters. Breakfast skipping will lead children to the adverse health outcome especially weigh gain. Conversely, breakfast consumption is a way to ensure that they meet their daily nutrient and energy intakes.

Keywords: Breakfast skip, Obesity, Children

INTRODUCTION

Breakfast defined as an activity within 2 hours of waking, typically no later than 10:00 in the morning, and of an energy level between 20 and 35% of total daily energy needs.^{1,2} Based on that definition people admitted that breakfast is the first source food intake in the morning that could help people, boost up power to conducts their activities. It has generally been acknowledged that breakfast consumption is important in the provision of energy and nutrients, therefore most of parents believed that by breakfast their children would survive and give best performance in their schools. It is relevant to the recent study mentioned that regular breakfast consumption has been associated with overall dietary quality and nutritional profiles in school-aged children, they will avoid from unhealthy food and regarded able to improved cognitive performance in their school.³ Conversely, those who omit breakfast will meet adverse health consequences. Present study mentioned that breakfast skipping has closed relation to the weight gain

and become overweight and obesity, and addition for those who omit breakfast were found to have higher glucose, fasting insulin level, higher cholesterol and greater waist circumference than people with breakfast.⁴⁻⁶

But so funny, now day's huge people both developed and developing countries still omit breakfast with vary reasons. In Japan based on national dietary survey showed that the incidence of missing breakfast averages 14% in men and 9% in women, while in high school student be found 18% also miss breakfast and 4% in elementary school. In Korea found that 31% of people with aged 13-59 years regularly miss breakfast, most of them young age and unmarried. While other developing countries such as Indonesia, Philippines and Thailand found 1-13% people with different age group omit the breakfast⁷ include Malaysia and Singapore.

According to them reasons for skipping breakfast because of there being no food on table to consume in the morning or lack of time usually given as the main reason

to omit the breakfast, some other said that students often have ready access to high-calorie, nutritionally depleted foods in cafeteria and fast-food shops located around schools.

While recent study in urban Asian Indian school children age reported that inadequate knowledge about adverse effect of unhealthy nutrition in urban school children explain high intake of dietary fat and resulting prevalence of obesity in them.⁸ Therefore the aim of this study is to inform the readers that how breakfast skip influence children health outcome particularly in gain weight.

METHODS

Data for this review were collected from published papers between January 2008 to 2014 used Google scholars. The articles were limited to English language only by used breakfast skip, obesity and adolescent as keywords than continued by viewed their title and abstract.

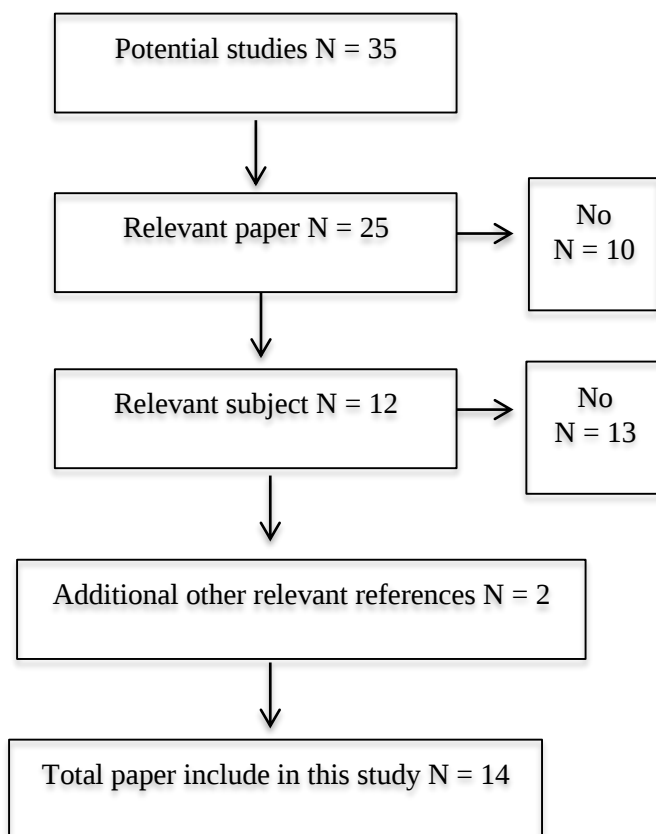


Figure 1: Flow diagram of study selection.

RESULTS

Entire relating papers in this study were identified for review. These papers were published in journals articles between 2008 till 2014 both developed and developing countries, such elaborated in table 1 below. Fourteenth papers that have viewed above inform us about influence of breakfast skipping to the children health status whereas

those who miss breakfast will experience body mass index (BMI) change.

DISCUSSION

Our findings show us that prevalence of breakfast skipping higher and it will affect the children health outcome such as elaborated above. Previous study mentioned that children who leave breakfast will has long screen time and make less children satiety, increase appetite and having large portion at subsequent meals. Consequently total energy density higher and become overweight and obesity ultimately 12. Another study also mentioned that those who miss breakfast would have longer screen time, as result they try to compensate by eat much snack and snacking by those who usually omit breakfast increase 1,5 times within a day, and those who have snacking habit also can increase the risk of over nutrition 7 times 1, 21. Therefore most of children who miss breakfast will easy to weight gain. Our study consistent with the previous studies and approve that breakfast skipping has closed relation to the obesity and affect children health ultimately. Conversely, breakfast consumption is an important factor to determine the quality of diet and energy intake that affect schoolchildren health status.²³

Limitations

This study reviewed was relatively few, distributed across many years and mostly used cross sectional design. Therefore to determine whether breakfast skip led to adverse health consequences are not to satisfy, further prospective studies are needed.

CONCLUSION

Breakfast skipping will lead children to the adverse health outcome especially weigh gain. Conversely, Breakfast consumption is an important determinant factor to ensure daily nutrient and energy intakes whereas able to keep children healthy.

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2. Pereira MA, Erickson E, McKee P, et al. Breakfast Frequency and Quality May Affect Glycemia and Appetite in Adults and Children. *The Journal of Nutrition*. 2011;(141):163S-8S.

Table 1. Review of influence breakfast skipping toward adolescent health.

No	Studies	Sample & population	Goal & Method	Statistical analysis	Result
1.	Gita Shafieea, et al. Association of breakfast intake with cardio-metabolic risk factors. <i>Journal Pediatric</i> , 2013;89(6):575-582	5,625 Iranian school students aged 10-18 years were recruited in this study.	This study aimed to evaluate the association of breakfast intake with cardio-metabolic risk factors in a nationally-representative sample of Iranian pediatrics	Logistic regression analyses (OR 1.96, 95% CI 1.18-3.27).	Seldom breakfast eaters had an increased risk of obesity, elevated TG and LDL-C, as well as low HDL-C compared to “regular breakfast eaters”. The risk of MetS was significantly increased in subjects who seldom ate breakfast ⁹ .
2.	Monika Arora, et al. Association of breakfast intake with obesity, dietary and physical activity behavior among urban school-aged adolescents in Delhi, India: results of a cross-sectional study. <i>BMC Public Health</i> 2012, 12:881	1814 students with 8th and 10 th grade.	Design: Cross-sectional study. The objective of this study describe the frequency of breakfast consumption among school-going adolescents in Delhi and evaluate its association with overweight and obesity as well as other dietary, physical activity, and sedentary behaviors	Regression models were employed, A dose–response relationship was observed such that overall prevalence of overweight and obesity among adolescents who consumed breakfast daily (14.6%) was significantly lower vs. those who only sometimes (15.2%) or never (22.9%) consumed breakfast (p<0.05 for trend).	Daily breakfast consumption is associated with less overweight and obesity and with healthier dietary- and physical activity-related behaviors among urban Indian students. ¹⁰ .
3.	G. Antonogeorgos, et. al. Breakfast consumption and meal frequency interaction with childhood obesity. <i>International Association</i>	The survey enrolment was 700 students (323 male and 377 female) aged from 10 to 12 years old	The purpose of the study was to examine the possible interaction effect between meal frequency and breakfast consumption on	Multiple logistic regression analysis with result (adjusted OR: 0.49, 95%, CI: 0.27–0.88).	Children, who consumed more than three meals per day and also consumed

No	Studies	Sample & population	Goal & Method	Statistical analysis	Result
	for the Study of Obesity. Pediatric Obesity 2011; 7, 65–72	who were selected from 18 schools.	childhood obesity		breakfast daily, were two times less likely to be overweight or obese. A combined higher meal frequency and daily breakfast consumption dietary pattern may prevent overweight and obesity in children ¹¹ .
4.	Leila Azadbakht Ph.D. et. al. Breakfast eating pattern and its association with dietary quality indices and anthropometric measurements in young women in Isfahan. Nutrition 2013;29; 420–425.	Women 18 to 28 y old were selected randomly from among university students (n = 411) in Isfahan, Iran	To assess the association between consuming or skipping breakfast and dietary quality indices	Multivariate analysis of variance was used for evaluating the dietary intake. Eating breakfast was associated with lower values for dietary energy density (0.96 ± 0.25 versus 1.04 ± 0.40 , $P=0.01$), the body mass index (20.0 ± 1.8 versus 23.3 ± 2.7 , $P=0.001$), and waist circumference (69.2 ± 7.6 versus 72.5 ± 8.7 , $P=0.001$).	Breakfast consumption was associated with higher scores of the dietary quality indices and lower values for the body mass index and waist circumference in young Isfahanian women ¹² .
5.	Lena Hallstrom, Et. Al., Breakfast consumption and CVD risk factors in European adolescents: the HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) Study. Public Health Nutrition,	European adolescents, aged 12.50–17.49 years, from ten cities within the HELENA study (n 2929, 53% females).	The design of this study is cross-sectional which aim to examine the association between breakfast consumption and CVD risk factors in European adolescents	We performed a two-way analysis of covariance (with breakfast consumption and weight status as fixed factors)	Our findings in European adolescents confirm previous data indicating that those who regularly consume

No	Studies	Sample & population	Goal & Method	Statistical analysis	Result
	2012; 16(7), 1296–1305			adjusting for the covariates (P<0.001, R=0.13).	breakfast have lower body fat. Eating breakfast regularly may also negate somewhat the effect of excess adiposity on total cholesterol (TC) and LDL-C in male adolescents ¹³ .
6.	Maureen T. Timlin, PhD, et. al. Breakfast Eating and Weight Change in a 5-Year Prospective Analysis of Adolescents: Project EAT (Eating Among Teens). <i>Journal of the American Academy of Pediatrics</i> 2008; 121(2); e638-e645	Sample size for these analyses was 2216 participants (1007 boys and 1215 girls). The mean age of all of the study 14.9 ± 1.6 years and 19.4 ± 1.7 years.	5-year longitudinal study of eating patterns and weight concerns among adolescents that aim to examine the association between breakfast frequency and 5-year body weight change	Multivariable linear regression (SAS PROC GLM) was used whereas p value P<0.001	The finding from this study shown us that both time 1 and 2 there be significant inverse association between breakfast frequency and BMI ¹⁴ .
7.	Natalia Romero-Sandoval., et. Al. Breakfast Habits and Family Structure Associated with Overweight and Obesity in General Basic Students, Ecuador. <i>British Journal of Medicine & Medical Research</i> 2013;3(1): 128-139.	6964 students (3254 males, 3710 females; age range 9 - 17 years).	This study used Cross sectional design that aim to characterize the consumption and type of breakfast associated with overweight and obesity in students of the Quito Metropolitan area in the academic year 2010-2011.	Logistic regression modeling with result PR was 1.29 (CI95% 1.11-1.50) (OR 1.4 CI95% 1.2-1.8).	Implying that there were 29% more cases of excess weight among the children who did not usually have breakfast compared to those who did ¹⁵ .
8.	SPP Tin, SY Ho, KH Mak, KL Wan and TH Lam. Breakfast skipping and change in body mass index in young children. <i>International Journal of Obesity</i> (2011) 1–8	113 457 school children who seat in the grade 4 were recruited in this study	The design of this study cross sectional which aim to assessed the association between breakfast skipping and body mass index (BMI) among young Chinese children in Hong Kong	Multivariable linear regression breakfast skippers had a higher mean BMI than did eaters among both primary 4	Breakfast skippers were significantly more likely to experience a greater increase in BMI than

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				($\beta=0.77$, 95% CI): 0.67–0.87) ($P<0.001$) and primary 6 children ($\beta=0.86$, 95% CI: 0.78–0.95) ($P<0.001$). Compared with eaters, baseline breakfast skippers experienced a greater increase in BMI in the subsequent 2 years ($\beta=0.11$, 95% CI: 0.07–0.16) ($P<0.001$)	were eaters. In addition, breakfast skipping has been related to lower levels of physical activity that may subsequently lead to weight gain through affecting energy balance ¹⁶
9.	Jonas J Thompson., et. Al. Breakfast skipping as a risk correlate of overweight and obesity in school-going ethnic Fijian adolescent girls. <i>Asia Pac J Clin Nutr</i> 2010;19 (3):372-382	523 ethnic Fijian adolescent were recruited in this study	Design in this study is cross sectional which aim to assess the prevalence of overweight, obesity, and breakfast skip- ping and examine their cross-sectional association in a community	Multivariable analyses unadjusted for eating pathology with result (OR)=1.15, (CI)=1.06, 1.26, $p<0.01$) and obesity (OR)=1.18, CI=1.05, 1.33, $p<0.01$).	We found that more frequent breakfast skipping was associated with greater odds of overweight. Overweight and obese participants were significantly more likely to skip breakfast than normal-weight participants ¹⁷ .
10.	Tanja VE Kral, et. al. Effects of eating breakfast compared with skipping breakfast on ratings of appetite and intake at subsequent meals in 8- 10 y old children. <i>Am J Clin Nutr</i> 2011;93:284–91.	Participants in this study 21 children which composed of 15 girls and 6 boys with 8-10 years old	The primary aim of this study was to test the effects of consuming breakfast compared with omitting breakfast on energy intake, percentage of calories from fat, and dietary energy density at subsequent meals in children aged between 8 and 10 years	Using mixed-effects linear models for repeated measures. There was a significant main effect of breakfast condition ($P=0.04$) on total daily energy intake	In this study, skipping breakfast affected children's appetite ratings but not their energy intake at subsequent meals. Indicated that on the day

No	Studies	Sample & population	Goal & Method	Statistical analysis	Result
					when the subjects did not eat breakfast, they consumed 362 more calories than on the day when they skipped breakfast ¹⁸ .
11.	Hannah G Lawman, et al. Breakfast patterns among low-income, ethnically- diverse 4th-6th grade children in an urban area. BMC Public Health 2014, 14:604 ;1-9	Data obtained from 651 4th-6th graders (51.7% female, 61.2% African American, 10.7 years	A cross-sectional analysis was conducted with aim to describe morning food and drink consumption patterns among low-income, urban children and their associations with relative weight.	Separate logistic regressions were used. A greater proportion of obese youth had no breakfast (18.0%) compared to healthy weight (10.1%) and overweight youth (10.7%, p = .01)	The number of breakfasts consumed and BMI percentile showed a significant curvilinear relationship, with higher mean BMI percentiles observed among children who did not consume any breakfast and those who consumed ≥ 3 breakfasts ¹⁹ .
12.	I. Fernandez Morales, et al. Breakfast quality and its relationship to the prevalence of overweight and obesity in adolescents in Guadalajara (Spain). Nutr Hosp. 2011 ;26:952-958. DOI: 10.3305/nh.2011.26.5.5103	467 secondary school students ranging from 12 to 17 years in the city of Guadalajara (Castilla-La Mancha, Spain) during the 2003-2004 school year.	Cross sectional study was conducted in this study with aim to study the impact of breakfast quality and skipping breakfast on the BMI and on the prevalence of overweight and obesity.	Daily intake of macronutrient especially Energy and carbohydrate for full breakfast eater (2267.83 $\pm$ 523.31, 235.50 $\pm$ 62.14), while for not full breakfast eaters (2589.72 $\pm$ 118.93, 257.52 $\pm$ 46.62) with P<0.01.	Skipping breakfast was not an effective way to lose weight, and weight was inversely related to breakfast quality ²⁰ .
13.	Hyun Ah Park, et. al.	1536 Korean	Cross-sectional study	Multiple logistic	We confirmed

No	Studies	Sample & population	Goal & Method	Statistical analysis	Result
	Breakfast Skipping, Related Factors, and Nutrients Intake of 5th Grade Students. Korean Journal of Family Medicine 2011;32(1):11-20.	students at 5 th grade which is consist of 235 boys and 231 girls	with aim to assess factors associated with breakfast skipping and its effects on food and nutrients intake in 5th grade children from the obesity and metabolic disorders cohort	regression analysis, The breakfast skippers were more obese (P = 0.011).	breakfast skipping is a risk factor of nutrients deficiency (quantity) and is also related with food intake quality ²¹ .
14.	A N Onyiriuka, D D Umoru, A N Ibeawuchi. Weight status and eating habits of adolescent Nigerian urban secondary school girls. S Afr J CH 2013;7(3):108-112.	The study sample was 2 097 adolescent urban public school girls, aged 12 - 19 years.	Cross-sectional study with aim To assess the weight status and eating habits of adolescent urban secondary school girls in Benin City, Nigeria	The prevalence of both overweight (24.5% v. 13.2%) and obesity (2.5% v. 1.1%) were higher in girls who skipped meals compared with their peers who did not (OR 0.4; 95% CI 0.32 - 0.50)	This study revealed that adolescent schoolgirls who skip meals have a higher prevalence of both overweight and obesity ²² .

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