

Breakfast consumption and childhood obesity

A narrative review paper

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ABSTRACT

Childhood obesity is considered to be one of the most serious health problems with an increasing prevalence all over the world, especially in Western countries. Several evidence suggests that breakfast consumption is very important for a healthy and balanced diet; however, the influence of breakfast consumption and composition in the development of obesity is not conclusive. The aim of this study was to examine the role of breakfast in the development of obesity in children. A literature review was conducted including a selection of relevant articles published over the last ten years. Most of the studies examined indicated negative association between breakfast consumption and the development of obesity in children; however, the underlying mechanism is still unclear. Therefore, we should promote regular breakfast consumption in this age group to prevent the development of obesity.

KEY WORDS: *Breakfast, breakfast consumption, obesity, childhood obesity*

INTRODUCTION

Childhood obesity is recognized as a major public health problem in our century and has been described as a “global pandemic”.¹ Childhood obesity has been associated with early development of dilation, endothelial and cardiovascular dysfunction and atherosclerosis.^{3,9} The prevalence of obesity has increased significantly over the last years, with the number of overweight/obese children and adolescents at the age group between 5 to 19 years old reaching 18% in 2016 in comparison to 4% in 1975, globally.² According to the latest estimations from 2015-2017, countries of southern Europe are those with the highest prevalence of childhood obesity. Specifically,

Cyprus, Greece, Italy, Malta, San Marino and Spain belong to the countries where approximately 20% of the boys are obese. On the other hand, Denmark, France, Ireland, Latvia and Norway belong to the countries with the lowest prevalence of childhood obesity, with less than 10% both for boys and girls.³ The GRECO study in Greece in 2010 underlined the alarming rates of obesity not only for boys but also for girls, with a percentage of 12.9% and 10.6%, respectively being obese.⁴

A recent determinant of breakfast suggests that “*Breakfast is the first meal of the day that breaks the fast after the longest period of sleep and is consumed within 2 to 3 h of waking; it is comprised of food or beverage from at least one food group, and may be consumed at any location*”.⁵ The importance of breakfast has been widely recognized, making it the most essential meal of the daily routine, since it has been associated with healthier behaviours, it may have a

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protective role against chronic diseases and increases the cognitive and school performance among children and adolescents.⁶ It has been estimated that breakfast provides approximately 20% of the daily energy intake¹⁰ and should consist of grain (especially whole grain), fruit or juice and food rich in calcium like (semi)-skimmed milk products.⁷ Despite the benefits of breakfast consumption more and more children tend to abstain from this healthy habit.^{8,14,15} Additionally, skipping breakfast has been associated with an increased risk of developing health problems, including cardiometabolic diseases and diabetes type 2.⁹

Thus, the purpose of the present narrative review paper was to examine existing data on the association between breakfast consumption and the development of obesity in children and adolescents.

MATERIAL AND METHODS

Although this work is a narrative review, an attempt was made to search the literature with a more formal way. Thus, a literature search was held retrieving original articles from the scientific databases PubMed and Scopus. The time frame was the last decade, i.e., between 2008 to 2018, using as key words the following MeSH (Medical Subjects Headings) terms and keywords: "breakfast", "diet patterns", "skipping breakfast", "breakfast benefits", "children", "adolescents", "childhood overweight/obesity", "prevalence of childhood obesity", "trends of obesity", "increased Body Mass Index (BMI) in children". Articles written in English, whose primary or secondary objective was the association of breakfast consumption with childhood obesity, were included. Moreover, the selected studies referred to children and adolescents younger than 18 years old. The search retrieved 50 relevant papers, of which 23 were finally selected; from the 26 articles included in this review, 4 were prospective cohort studies, 15 cross-sectional studies, 3 cross-national studies, 2 school-based surveys, one pooled analysis and one systematic review.

Trends of breakfast consumption

A cross-sectional study in France identified four main dietary patterns. The study was conducted during 2010-2011 in 529 children 9-11 years old, and used dietary records from children and/or their parents about breakfast composition. In order to identify the most frequent dietary patterns, the breakfast items were classified into 15 solid and 15 liquid food categories, which were analysed by component. The most frequent pattern that was presented in the analysis was "Sweets Breakfast" which was consumed by 45.1% of the children with main components flavoured milk and sweets, especially brioche and chocolate spread, as well as water or juice. The "Traditional French Breakfast"

including flavoured milk, bread, fat (especially butter) and juice was preferred by 27.2% of the participants. After that, the "Ready-To-Eat-Cereals (RTEC)+Milk Breakfast" which consisted of RTEC, milk and juice was consumed by 18.1% of the children, while another 9.5% chose the "Dairy and Juice Breakfast" that included mostly dairy products (whole milk/yogurt or yogurt drinks), sweets and tea or juice.¹⁰ Obviously, the majority of children prefer having for breakfast foods rich in energy and fats such as flavoured milk, sweets and fat in comparison to RTEC, milk and dairy products which are very rich in minerals and vitamins. This could probably be explained by the fact that the components of "Sweets Breakfast" and "Traditional French Breakfast" are tastier than the components of "RTEC+Milk Breakfast" and "Dairy and Juice Breakfast", making those foods more preferable, although they lack micronutrients and are less nutritional.

A cohort study in Brazil focused on the changes of the foods/group of foods that were preferred for breakfast from 488 adolescents in Rio de Janeiro from 2010 to 2013. The Food Frequency Questionnaire (FFQ) that was used, included 72 commonly consumed foods and beverages and the participants were given 3 options (monthly to no consumption/weekly/daily) to estimate the consumption of each food over the last 3 months. After that, there were 14 foods/food groups defined: cheese, milk, chocolate powders, fruits, bread, coffee, ham, chips, cookies, eggs, sweets, sugar sweetened beverages and snack and sandwiches. The analysis showed that most of the food groups were consumed less frequently in 2013 compared to 2010. Both boys and girls appeared to have a higher risk of decreased consumption of fruits (RR=1.60, 95% CI: 1.20, 2.13 for boys, RR=2.08, 95% CI: 1.47, 2.95 for girls) and ham (RR=1.52, 95% CI: 1.12, 2.07 for boys, RR=1.65, 95% CI: 1.16, 2.36 for girls) after 3 years. Chips, sandwiches and snacks were consumed less frequently among boys (RR=1.43, 95% CI: 1.01, 2.13 and RR=1.58, 95% CI: 1.22, 2.22 respectively), while milk and chocolate powder was less consumed among girls (RR=1.49, 95% CI: 1.07, 2.08 and RR=1.54, 95% CI: 1.11, 2.14 respectively) after three years of follow-up. Last but not least, the only food with statistically significant lower risk for reduction was cheese but only among boys (RR=0.73, 95% CI: 0.53, 1.00).¹¹ The changes mentioned above display a trend to less healthy preferences over time. This may be explained by the fact that boys and girls of the sample were in adolescence, which is a period that affects the behavior, making them want make their own choices and sometimes trying to be opposed to their parents, so changing the foods their parents used to give them may be part of that.¹²

Despite the benefits of breakfast consumption, there is a significant number of children and adolescents skipping

breakfast.^{8,14,15} The Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) Study, a cross-sectional study of 2,929 adolescents from 10 different European countries aimed to associate the frequency of eating breakfast with CVD risk factors. 54% of the adolescents were classified as “consumers”, 8% as “occasional consumers” and 38% as “skippers” based on their answer in the statement “I often skip breakfast”. 925 of the total sample participated in blood analyses and measurements. The results indicated that consuming breakfast regularly is associated with a better image of cardiorespiratory fitness in both sexes ($p < 0.001$). Especially for males, not skipping breakfast seems to be associated with a healthier cardiovascular profile, while at the same time it has the ability to diminish the consequences of excess adiposity on total cholesterol (TC) and Low-Density Lipoprotein-Cholesterol (LDL-C) with an unknown mechanism ($p < 0.001$).¹³ As it was recently documented, breakfast consumption on a regular basis is very important for having a healthy lifestyle with a great impact on cardiovascular, cardiorespiratory and cardio-metabolic profiles among others,^{14,15} while the adverse effects of skipping breakfast may be obvious even after a very long time when adolescents become adults¹⁶ (Table 1).

Prevalence of childhood obesity

The Non-Communicable Diseases Risk factor Collaboration (NCD-RisC) recently underlined the increasing prevalence of childhood obesity worldwide. According to a large pooled analysis conducted from 1975 to 2016, age-standardised prevalence of obesity increased both for boys and girls in all 200 participated countries. High-income countries appeared to have a relatively small increase of approximately 30-50% per decade, while the same number for countries of southern Africa is almost 8 times higher, reaching 400% per decade. The number of obese girls in 2016 was 10 times higher than in 1975 with a similar increase among boys, approximately 12 times higher compared to 1975.¹⁷ Those facts confirm the necessity of a new strategic plan to prevent the prevalence of obesity among all age groups.

Focusing on Europe, the Identification and prevention of Dietary- and lifestyle-induced health Effects In Children and infantS (IDEFICS) study from 2007 to 2008 showed that the prevalence of obesity among the participant countries was as follows: Italy 20%, Cyprus 8.4%, Hungary 6.4% and Spain 6.2%. The countries with the lowest prevalence of obesity were Sweden (2.2%) and Belgium (2.3%).^{18,19} The difference in the prevalence of obesity among the countries reflects the differences in dietary and lifestyle patterns, with the first ones having adopted less healthy habits, such as less adherence to Mediterranean diet, de-

creased physical activity, sedentary lifestyle and increased time spent on television.²⁰⁻²² The analysis of the data of the Health Behaviour in School-aged Children (HBSC) study indicated that in almost half of the European countries overweight and obesity frequency did not increase any further from 2002 to 2010.²³ This observation is in agreement with the results of other studies showing a plateau in the development of obesity in the same study period.²⁴ The reasons leading to this plateau have not been clear yet. A possible explanation could be that the strategies to prevent obesity over the years have been successful and this plateau is their result. Apart from that, this stabilization may reflect the need to reassess the definition of childhood obesity according to recent anthropometric measurements. Nevertheless, more studies are needed to clarify this situation.

Childhood obesity seems to be a very serious problem in Greece. A cross-sectional study from 2010 to 2011 in 124,113 children, was conducted in order to estimate the frequency of childhood and central obesity (Table 2). The analysis showed that 8.8% of the participants suffered from obesity, of which 95% also had central obesity.²⁵ At the same period, the ADOlescent NUTrition (ADONUT) study assessed 37344 Greek adolescents indicating that in this age group the obesity rate was 7.5%, while 5.1% of them also had central obesity. Splitting the sample by sex, 8.9% of the boys were obese alongside with central obesity in 5.1% of them; while among girls the rates were 6.0% and 3.9%, respectively.²⁶ The aforementioned results were also confirmed by a more recent study, the EYZHN programme including information about 336,014 Greek children and adolescents from a nationwide, school-based survey. The study showed that 9% of the boys were obese, with almost all of them (95%) having developed central obesity, while 7.5% of girls were obese with 93.5% of them having central obesity. Moreover, it was observed that as children entered puberty, the prevalence of obesity decreased.²⁷ This information about the prevalence of obesity in Greece agrees with the results of other surveys,^{28,29} while the decreasing tendency while growing up is also confirmed by other researchers.²⁸

Association between breakfast consumption and childhood obesity

A recent cross-sectional study in southwest Turkey in 2015 aimed to study the frequency of breakfast consumption and its association with BMI in 7116 children and adolescents 6-18 years old. The results of the analysis indicated an association between skipping breakfast and childhood obesity. It was observed that 62.6% of the children used to eat breakfast every day, while only

TABLE 1. Breakfast consumption

Source	Type of Study	Study Sample	Study Results	Conclusions
Lepicard EM, et al, 2016 ¹⁰	Cross-sectional study	529 children aged 9-11 years (n=269 boys)	4 main dietary patterns: • RTEC and milk breakfast: 18.1% • Sweets breakfast: 40.0% • Traditional French breakfast: 27.2% • Dairy and Juice breakfast: 9.5%	Sweets breakfast and Traditional French breakfast were the most preferable
Hassan BK, et al, 2018 ¹¹	Prospective cohort study	809 adolescents 10-16 years old (n=435 boys) → 488 adolescents 12.9-18.6 years old (n=259 boys)	14 foods/food groups: cheese, milk, chocolate powders, fruits, bread, coffee, ham, chips, cookies, eggs, sweets, sugar sweetened beverages, snack and sandwiches	Higher risk of decreased consumption: • fruits (RR=1.60, 95% CI: 1.20, 2.13 for boys, RR=2.08, 95% CI: 1.47, 2.95 for girls) and ham (RR=1.52, 95% CI: 1.12, 2.07 for boys, RR=1.65, 95% CI: 1.16, 2.36 for girls) for both sexes • milk and chocolate powder only for girls (RR=1.49, 95% CI: 1.07, 2.08 and RR=1.54, 95% CI: 1.11, 2.14 respectively) • chips, sandwiches and snacks only for boys (RR=1.43, 95% CI: 1.01, 2.13 and RR=1.58, 95% CI: 1.22, 2.22 respectively)
Alexy U, et al, 2010 ⁸	(Open) Cohort study (The DONALD study)	1,081 children and adolescents 2-18 years old (n=534 boys)	Regular breakfast: 75% Irregular breakfast: 18% Skipping breakfast: 7%	25% of the sample did not eat breakfast regularly
Hallstrom L, et al, 2013 ¹³	Cross-sectional study (The HELENA study)	2,929 adolescents 12-17 years old (53% females)	• Cardiorespiratory fitness: higher in consumer boys and girls • Cardiovascular profile: healthier in consumer boys only	Consuming breakfast regularly was associated with a better image of cardiorespiratory fitness both for boys and girls (p<0.001) and a healthier cardiovascular profile only among boys (p<0.001)
Sandercock GRH, et al, 2010 ¹⁴	Cross-sectional study	4,326 schoolchildren 10-16 years old (n=2,336 boys)	• Boys: never eating breakfast were twice as likely to have low CRF compared with those who always did • Girls: no statistically significant association between frequency of breakfast consumption and CRF	CRF levels were lower for boys skipping breakfast than those who always eat (OR 2.02, 95% CI 1.40, 2.93)
Shafiee G, et al, 2013 ¹⁵	School-based nationwide health survey (the CASPIAN study)	5,625 students 10-18 years old (n=2,818 boys)	• TG, LDL-C, SBP: higher in seldom breakfast consumers compared to the other groups • HDL-C: lower in seldom breakfast consumers compared to the other groups	Skipping breakfast was associated with increased risk of MetS (OR 1.96, 95% CI 1.18, 3.27) and other cardiometabolic factors (OR 1.41, 95% CI 1.03, 1.93)
Smith KJ, et al, 2010 ¹⁶	Prospective cohort study (the CDAH study) = follow-up of ASHFS (1985)	2,184 participants 26-36 years old in 2010 (n=1,020 males)	• Fasting insulin, TC, LDL-C: increased levels in breakfast skippers both as children and as adolescents • Lifestyle score: lowest in breakfast skippers both as children and as adolescents	Skipping breakfast in childhood was associated with increased cardiometabolic risk factors and quality of life in adulthood (p<0.05)

Abbreviations: RTEC: Ready-To-Eat-Cereals, RR: Relative Risk, CI: Confidence Interval, CRF: CardioRespiratory Fitness, OR: Odds Ratio, TG: Triglycerides, LDL-C: Low-Density Lipoprotein-Cholesterol, SBP: Systolic Blood Pressure, HDL-C: High-Density Lipoprotein-Cholesterol, MetS: Metabolic Syndrome.

3% of the total sample reported never eating breakfast. Studying the sample separately for children aged 6-11 years and adolescents aged 12-18 years it was obvious that skipping breakfast was a more widespread habit among adolescents compared with children, since 47.9% of the former skipped breakfast vs 20.9% of the latter (p<0.001). Among overweight and obese children and

adolescents, 25% reported skipping breakfast every day and they reported skipping breakfast more frequently than those with normal weight (p<0.05).³⁰ The association between skipping breakfast and being overweight or obese is documented in several studies, underlying the need of interventions promoting the benefits of breakfast consumption on a regular basis.^{14,31-33}

TABLE 2. Childhood obesity

Source	Type of Study	Study Sample	Study Results	Conclusions
NCD Risk Factor Collaboration, 2017 ¹⁷	Pooled analysis	-	Global age-standardized prevalence of obesity in children and adolescents: • girls: 0.7% in 1975 → 5.6% in 2016 • boys: 0.9% in 1975 → 7.8% in 2016 Proportional increase: • high income countries: 30-50%/decade • southern Africa: 400%/decade	• The prevalence of obesity increased globally • High income countries: the smallest proportional increase vs southern Africa: largest increase
Ahrens W, et al, 2014 ¹⁹	Prospective cohort study (the IDEFICS study)	18,501 children 2-10 years old (n=9,331 boys)	• prevalence of obesity in Europe: 7% • prevalence of obesity in each country: Italy: 20%, Cyprus: 8.4%, Hungary: 6.4%, Spain: 6.2%, Germany: 4.7%, Estonia: 3.9%, Belgium: 2.3%, Sweden: 2.2%	• The prevalence of obesity in Europe was 7% • Highest obesity prevalence: Italy, Cyprus, Hungary and Spain • Lowest obesity prevalence: Belgium and Sweden
Ahluwalia N, et al, 2015 ²³	Cross-national survey (3 cycles of the HBSC study)	Adolescents 11-, 13- and 15- years old	The prevalence of overweight/obesity: • Croatia, Czech Republic, Estonia, Greece, Latvia, Macedonia, Poland, Russia, Slovenia and Ukraine: increase of prevalence for both sexes • Austria, Sweden, Hungary: increase of prevalence only for boys • Germany: increase of prevalence only for girls • In none of the countries observed decrease of prevalence	Almost half of the countries didn't appear to have neither increase nor decrease in the prevalence of OW/O
Rokholm B, et al, 2010 ²⁴	Systematic review	-	-	Stabilization on the prevalence of childhood obesity in Europe since 1999 until 2010
Grigorakis DA, et al, 2016 ²⁵	Cross-sectional study	124,113 children 9-11 years old (n=63,298 boys)	• Prevalence of childhood obesity: 8.8% • Prevalence of central obesity among obese children: 95%	The total prevalence of childhood obesity in Greece was 8.8%, with central obesity coexisting in the majority
Grammatikopoulou MG, et al, 2014 ²⁶	Cross-sectional study (the ADONUT study)	37,344 adolescents 12-19 years old (n=18,067 boys)	Prevalence of obesity: • 7.5% of total sample • 8.9% of the boys • 6.0% of the girls Coincident of simple and central obesity: • 4.5% of total sample • 5.1% of the boys • 3.9% of the girls	The total prevalence of obesity was 7.5%, 8.9% among boys and 6.0% of the girls and in over half of them coexisted central obesity at the same time
Tambalis KD, et al, 2018 ²⁷	School-based survey (the EYZHN program)	336,014 children and adolescents 4-17 years old (n=171,367 boys)	Prevalence of obesity: • boys: 9% (95.3% central obese). • girls: 7.5% (93.5% central obese) Changes on the prevalence of obesity from childhood (11 years old) to adolescence (17 years old): • boys: 8.8% → 6.5% • girls: 6.4% → 4.3%	• 9% of the boys and 7.5% of the girls were obese, while in the majority of them coexisted central obesity • The prevalence of obesity seemed to have a decreasing tendency when children entered puberty
Kleanthous K, et al, 2015 ²⁸	Cross-sectional study	1,327 children and adolescents 6-16 years old (n=703 boys)	Obesity prevalence in 2009: • boys: 43% • girls: 33.4% Obesity prevalence in 2012: • boys: 37.3% • girls: 26.9%	The prevalence of obesity in children and adolescents decreased both for boys and girls since 2009 until 2012
Patsopoulou A, et al, 2015 ²⁹	Cross-national study (initial phase of FETA project)	816 adolescents 12-18 years old (n=360 boys)	Prevalence of obesity: • boys: 8.9% • girls: 2%	The prevalence of obesity was 8.9% among boys and 2% among girls

Abbreviations: NCD: Non-Communicable Diseases, OW/O: Overweight/Obese

The Healthy Growth Study, a cross-sectional study in Greece was conducted in order to identify lifestyle patterns and their association with obesity and fat mass in children. The sample consisted of 2073 children aged 9-13 years old. Anthropometric measurements and 3 different 24-hour recall morning interviews were conducted to collect information about dietary habits, physical activity levels. Body fat and visceral fat mass were assessed with a standardized activity interview and Bioelectrical Impedance Analysis (BIA) respectively. The Principal Component Analysis (PCA) came up with 5 different lifestyle components. Component 1 consisted of high consumption of dairy products and breakfast including fruit, cereals or dairy products and was found to be negatively associated with BMI and fat mass ($p=0.07$ and $p=0.029$ respectively). Moreover, children who reported having dietary habits close to those of component 1 seemed to be less likely to become overweight or obese (OR=0.64, 95% CI: 0.46, 0.79). Component 2 included higher consumption of high-fibre foods, component 3 consisted of more screen time, less sleep time and higher consumption of sugared beverages, component 4 included more time spent on moderate-to-vigorous physical activity (MVPA) and more frequent meals and component 5 consisted of higher consumption of red meat and lower consumption of fish. Among them, only component 4 was also found to be negatively associated with BMI and fat mass ($p=0.024$ and $p<0.001$ respectively), since the results of the analysis of the other components did not indicate statistically significant associations.³⁴ The results indicating that patterns including regular breakfast consumption are associated with lower risk of becoming overweight or obese are confirmed by other researchers too. This suggests that breakfast consumption may have a protective role against obesity, underlying the importance of breakfast in daily routine of children³⁵⁻³⁸ (Table 3, Figures 1, 2).

CONCLUSION

It is obvious that breakfast consumption is associated with the development of obesity among children and adolescents. The present review included the most recent studies about breakfast and its relation to body weight, indicating that skipping breakfast is a behaviour that is often met among obese children. In conclusion, public health professionals should implement effective intervention programs to motivate children and adolescents to consume breakfast on a daily basis. Parents and teachers

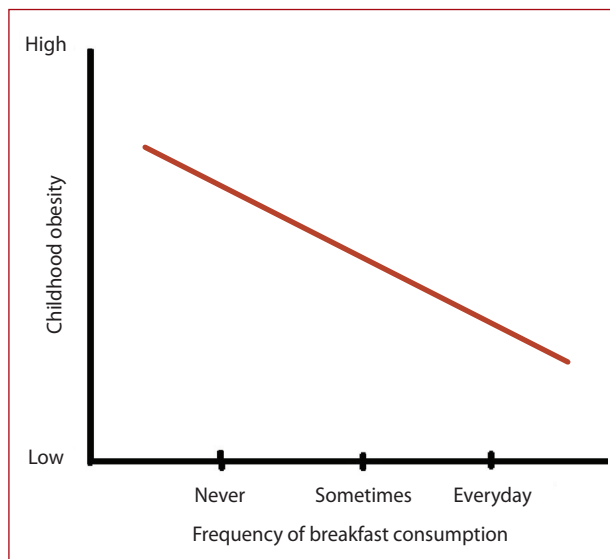


FIGURE 1. The number of children with childhood obesity was associated with the frequency of breakfast consumption.

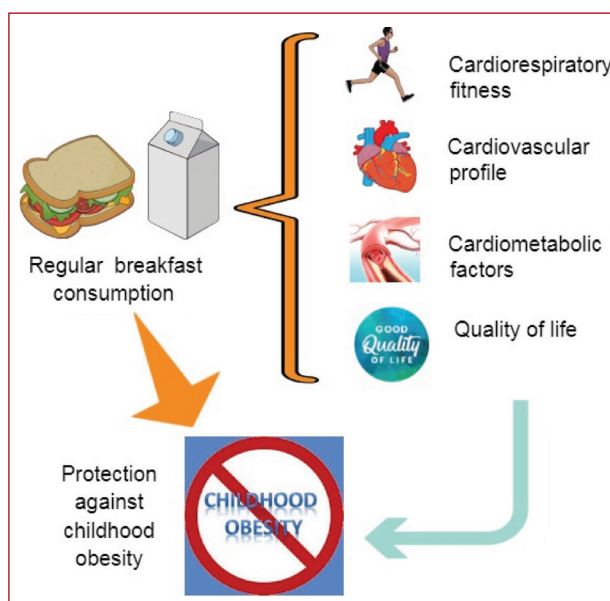


FIGURE 2. Association between breakfast consumption, cardiovascular health and childhood obesity.

should provide and support healthy environments so as children to develop healthy lifestyle habits.

Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

TABLE 3. Associations between breakfast consumption and childhood obesity.

Source	Type of Study	Study Sample	Study Results	Conclusions
Koca T, et al, 2017 ³⁰	Cross-sectional study	7,116 children and adolescents 6-18 years old (n=3,671 boys)	<ul style="list-style-type: none"> • 25% of OW/O participants reported never eating breakfast • OW/O participants had a higher possibility on skipping breakfast in comparison to normal weight participants 	Skipping breakfast was positively associated with OW/O ($p<0.05$)
Sandercock GRH, et al, 2010 ¹⁴	Cross-sectional study	4,326 schoolchildren 10-16 years old (n=2,336 boys)	Children who didn't eat breakfast were more likely to become obese than those eating breakfast every day	Skipping breakfast was associated with an increased risk of obesity ($p<0.05$)
Fayet-Moore F, et al, 2016 ³¹	Cross-sectional study (ANCPAS)	4,487 children and adolescents 2-16 years old (n=2,249 boys)	<ul style="list-style-type: none"> • Among breakfast consumers 16.5% were obese • Among breakfast skippers 23.2% were obese 	Breakfast consumers were more likely to be normal weight than breakfast skippers ($p<0.001$)
Smetanina N, et al, 2015 ³²	Cross-sectional study	3,990 children and adolescents 7-17 years old (n=1,920 boys)	Skipping breakfast: -9.6% of OW/O participants. -6.5% of normal weight participants	Skipping breakfast was associated with increased levels of obesity ($p<0.05$)
Veltsista A, et al, 2010 ³³	Cross-national study	6,468 adolescents 16 years old (n=3,110 boys) + 2,842 adolescents 17- and 18- years old (n=1,291 boys)	Finnish and Greek boys who did not consume breakfast every day had 40% and 30% higher risk of being OW/O respectively in comparison to daily consumers	Not consuming breakfast every day was associated with higher levels of OW/O both for Finnish and Greek boys ($p<0.001$ and $p=0.001$ respectively)
Moschonis G, et al, 2014 ³⁴	Cross-sectional study (the Healthy Growth Study)	2,073 children 9-13 years old (n=1,032 boys)	Identification of a lifestyle component characterised by higher daily consumption and breakfast including fruit, cereals or dairy products → associated with lower levels of BMI, WC, sum of skinfold thicknesses and % fat mass	The component including breakfast consumption was associated with a lower risk of childhood OW/O (OR=0.64, 95% CI: 0.46, 0.79) and lower BMI and % fat mass ($p=0.07$ and $p=0.029$ respectively)
Kontogianni MD, et al, 2010 ³⁵	Cross-sectional study	1,305 children and adolescents 3-18 years old (n=627 boys)	Identification of a lifestyle component characterised by higher eating frequency, breakfast consumption and higher KIDMED score → associated with lower BMI	Breakfast consumers were less likely to be OW/O than skippers ($p<0.001$)
Nagel G, et al, 2009 ³⁶	Cross-sectional study	1,079 children 6-9 years old (n=577 boys)	Skipping breakfast before school was related to obesity	Breakfast skippers had increased risk for obesity (OR 2.50, 95% CI 1.19, 5.29)
Kyriazis I, et al, 2012 ³⁷	Cross-sectional study	2,374 children 6-12 years old (n=1,206 boys)	Habits found to be associated with obesity: <ul style="list-style-type: none"> • skipping breakfast • not consuming fruits and vegetables • consuming bread • consuming refreshments 	Skipping breakfast was positively associated with obesity ($p<0.05$)
Mushtaq MU, et al, 2011 ³⁸	Cross-sectional study	1,860 children 5-12 years old (n=977 boys)	Skipping breakfast: <ul style="list-style-type: none"> • 15.4% of OW/O participants. • 6.6% of normal weight participants 	Skipping breakfast was an independent predictor of being OW/O (OR 1.82, 95% CI 1.22-2.71)

Abbreviations: OW/O: Overweight/Obese, BMI: Body Mass Index, WC: Waist Circumference, KIDMED: Mediterranean Diet Quality Index, OR: Odds Ratio, CI: Confidence Interval

ΠΕΡΙΛΗΨΗ

Κατανάλωση πρωινού γεύματος και παιδική παχυσαρκία: Μία αφηγηματική ανασκόπηση

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Η παιδική παχυσαρκία αποτελεί ένα από τα πιο σημαντικά προβλήματα υγείας με συνεχώς αυξανόμενη επίπτωση σε όλον τον κόσμο και κυρίως στις δυτικές χώρες. Πολλές μελέτες υποστηρίζουν ότι η κατανάλωση πρωινού παίζει σημαντικό ρόλο σε μια υγιεινή και ισορροπημένη διατροφή, αλλά δεν έχει φανεί το πόσο επηρεάζει την εμφάνιση παχυσαρκίας. Σκοπός της παρούσας μελέτης ήταν να εξεταστεί ο ρόλος του πρωινού στην εμφάνιση παιδικής παχυσαρκίας. Πραγματοποιήθηκε ανασκόπηση της βιβλιογραφίας για ανεύρεση σχετικών άρθρων των τελευταίων 10 χρόνων. Η πλειοψηφία των μελετών έδειξαν αρνητική συσχέτιση ανάμεσα στην κατανάλωση πρωινού και την εμφάνιση παιδικής παχυσαρκίας, ωστόσο δεν έχει διευκρινισθεί ακόμα ο υποκείμενος μηχανισμός. Επομένως, συστήνεται να ληφθεί υπόψη η σημασία του πρωινού στην παιδική ηλικία, με σκοπό να προωθηθεί η τακτική κατανάλωση πρωινού σε αυτήν την ηλικιακή ομάδα για την πρόληψη της εμφάνισης παχυσαρκίας.

ΛΕΞΕΙΣ ΚΛΕΙΔΙΑ: Πρωινό, κατανάλωση πρωινού, παχυσαρκία, παιδική παχυσαρκία

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