The Prevalence of Breakfast Skipping and its Association with Lifestyle Factors and Weight in 11-15 years Adolescents from Selected Lebanese Regions

Marise El-Chami, Yonna Sacre and Joane Matta

Abstract

Studies have shown that frequent breakfast skipping is associated to overweight and obesity problems. The habit of skipping breakfast is increasing among adolescents. The objective of this study is to determine the prevalence of breakfast skipping among adolescents living in Lebanon. Data was collected from 404 adolescents, located in three Lebanese districts. Anthropometric measurements through calibrated equipments and dietary intake were collected by a validated food frequency questionnaire (FFQ), sociodemographic and lifestyle information were obtained by a pre-tested questionnaire, in addition BMI for age was used to determine obesity. Linear and ANOVA regressions were used to assess the association between breakfast and BMI-for-age. Six definitions of breakfast skipping were used and the prevalence varied between 0.4% and 42.8%. Linear regression was used to test the association between breakfast skipping and BMI for age. Skipping breakfast was correlated with school type, parental preparation of food, sleeping duration, milk consumption and eating meals. The association between breakfast and BMI-for-age could not be settled due to the absence of a standard definition of breakfast skipping. Our findings could not confirm a relation between breakfast and BMI-for-age. Nevertheless, skipping breakfast was related to many factors. Encouraging breakfast could be efficient for the enhancement of health. New research could be settled to find reasons for obesity and to limit its impact on adolescents living in Lebanon.

Keywords: Breakfast; Weight change; Obesity; Overweight; BMI-for-age

Introduction

Today, overweight and obesity rates are on the rise worldwide reaching an epidemic level in the twenty-first century [1]. The IOTF (International Obesity Task Force) indicated that 1 in 10 school-aged children are overweight or obese [2]. According to the World Health Organization (WHO), high body mass index (BMI) during adolescence predicts elevated adult mortality and cardiovascular disease rates, even if the excess body weight is lost [3].

Obesity usually results from a combination of factors including physical inactivity, unhealthy diet, and certain eating habits including breakfast skipping [4]. The prevalence of breakfast skipping among children and adolescents ranges from 10 to 30% in the United States and Europe [5]. Several studies have demonstrated that breakfast consumption may influence appetite [6], dietary intake and composition [7] which may lead to weight gain [8,9] and increase the risk of chronic diseases [10]. Nonetheless, most of the existing studies remain unclear about whether there is a strong relationship between omitting breakfast and weight gain [11,12].

In Lebanon, several studies have shown a high prevalence of obesity in different age groups [13,14] and it was higher among adolescent boys than girls [15]. Moreover, in a large sample of Lebanese adolescents, Salameh et al. found a positive association between obesity and the frequency of dieting and taking diet pills [16].

An interesting hypothesis is that skipping breakfast in adolescents living in Lebanon may be associated with higher BMI-for-age, dieting practices, lower physical activity level, higher screen time and lower socio-economic status (SES).

The aim of the present study is to determine the prevalence of skipping breakfast and associated risk factors among a random sample of adolescents in public and private Lebanese schools from selected Lebanese regions.

Results of this study would be necessary to provide adequate preventive measures in order to decrease the impact of breakfast skipping on weight and healthy eating practices of adolescents living in Lebanon.

The major strength to this study is that, it would be the first comprehensive study to simultaneously assess the prevalence of breakfast skipping in a sample of Lebanese adolescents in combination with dietary assessment, age, gender, SES and BMI. However, the study is not without limitations; the study findings are not be generalizable beyond adolescents attending Lebanese private and public schools in all Lebanese regions, and because the study is cross-sectional in nature, causality cannot be inferred.

Material and Methods

Study design and sample size

This study is a cross-sectional investigation of the prevalence of skipping breakfast among adolescents aged between 11 and 15 years in three Lebanese districts (Jbeil, Kesrouan and Metn) and its effect on...
disorders, and some dietary habits were also assessed. Table 1 displays a
list of cigarettes, smoking, sleep duration, alcohol consumption, eating
breakfast. Physical activity, screen time and some lifestyle habits
Several questions were formulated to assess skipping meals, particularly
field.
measurements were held by a licensed dietitian trained to assess in the
for the purpose of the study. Data collection and anthropometric
offered in two languages (French or English) (Appendix 2) and adapted
from 34 Lebanese middle schools out of which 12 schools were public
and public schools, the different sizes of schools in terms of students’
enrollment and the differences between districts. In Jbeil and Kesrouan
regions, 2% of the schools’ adolescents and 1.3% in Metn District were
contacted for participation.

In total 404 adolescents agreed to participate and were selected from
34 Lebanese middle schools out of which 12 schools were public
and 22 were private. Adolescents aged less than 11 years or more than
15 years were excluded from the sampling.

Screening tests

Questionnaire: Students were asked to fill a pre-tested questionnaire
offered in two languages (French or English) (Appendix 2) and adapted
for the purpose of the study. Data collection and anthropometric
measurements were held by a licensed dietitian trained to assess in the
field.

The questionnaire included questions about age, gender, SES
(parental income and private or public school) and parental presence.
Several questions were formulated to assess skipping meals, particularly
breakfast. Physical activity, screen time and some lifestyle habits
(cigarette smoking, sleep duration, alcohol consumption), eating
disorders, and some dietary habits were also assessed. Table 1 displays a
brief description of the variables used in the current analysis.

Anthropometric measurements: Anthropometric measurements
were taken using standardized techniques and calibrated equipment.
Subjects were weighed to the nearest 0.1 kg in the morning wearing
basic school uniform. Using a stadiometer, height was measured
without shoes and recorded to the nearest 0.5 cm. WHO 2007 growth
charts were used to monitor growth for children and adolescent aged
between 5 and 19 years old that defined the development using z-scores
cutoff points [18]. Normal children have a z-score between -1 and 1. A
z-score above or equal 1 SD classifies the child as overweight; a z-score
above or equal 2 SD mark that the child is obese. As for a z-score below
-1 or equal is classified as marginally underweight, below or equal -2
the children is moderately underweight and below or equal -3 he is
severely underweight. Z-scores were calculated using the Anthro Plus
software [18].

Assessing skipping breakfast: Due to the absence of a standard
definition, skipping breakfast was assessed by several questions. First,
an open-ended question “In the last 7 days, on how many days did you
eat breakfast?” was asked with responses ranging from 0 to 7 days. Thus,
three definitions of breakfast skipping were created: Missing breakfast
at least once, at least three times, or at least six times in the past seven
days. Furthermore, skipping breakfast was also assessed by “where do
you usually eat breakfast?” Skippers were those who answered “I never
eat breakfast”. Energy intake during breakfast, derived from the 24-hour
recall, was another tool to assess skipping breakfast. Two definitions of
skipping breakfast were used. An adolescent is considered a skipper, if
on the day before collecting the data; ate nothing (0 Kcal) before 10 a.m.
or ate nothing (0 Kcal) before 12 p.m.

Dietary intake: A 24-hour recall was used to assess dietary intake
and was collected for the day before the adolescents’ interview, then
assessed by a free automated self-administered 24-hour recall (ASA24)
software [19].

Assessing other variables: Physical activity and screen time were
assessed using the 2011 Middle School Youth Risk Behavior Survey
questionnaire developed by the CDC [20]. For assessment of eating
disorders, the SCOFF questionnaire validated among adolescents has
been used [21,22]. An adolescent having a score equal or above 2 was
considered to be at risk for eating disorders.

Statistical analysis

Statistical analysis was executed using the Statistical Analysis for
Social Sciences (SPSS, version 16.0) and the level of significance was
set at p<0.05.

Frequencies and descriptive variables were conducted stratified
either by gender or by skipping breakfast. Means of age and
anthropometric measurements were calculated through an independent
sample t-test and ANOVA regression.

The z-scores drawn from the WHO 2007 reference were coded
differently according to different cutoffs and deducing the prevalence of overweight
and obesity.

Linear regression was performed for variables with more than 2
categories with the calculation for the significance.

The association between dietary intake of energy and macronutrients
was then assessed through Pearson correlation with the calculation of
the significance.

Results and Discussion

The main characteristic of the sample for this study is illustrated in
Tables 2 and 3. The mean age of the study, indicated in Table 2, is 13.7
± 1.010. Half of the participants have a normal BMI-for-age, while 25%
were overweight and 20% were obese. Boys were more obese than girls;
whereas, girls were overweight more than boys (Table 2).

Various definitions were used to assess skipping breakfast and the
prevalence varied between 8.4% according to the location till 42.8% for
skipping one or more days per week (Figure 1).

This percentage is comparable to the findings in previous studies.
Tim et al. found that 5.2% of Hong Kong children were skippers when
they used the location to define breakfast. Whereas in the same country,
when Cheng et al. defined breakfast skippers as missing to drink and
to eat before morning classes at least one school day during the past
week, they found a prevalence of 30.5% skippers [23]. Dialettkou et
al. used 24 different definitions for breakfast and the prevalence ranged
between 3.6% never eats in the morning and 74.7% eats on average 0-6
mornings/week [24,25]. Thus, care is needed while comparing breakfast
skipping with other studies and while assessing the association with
different health outcomes [25].

In this study, almost all various definitions agreed that girls skip
more breakfast than boys with p<0.05 but without any significance
when defining breakfast by calories similar to other studies (Table 4).
Timlin et al. found that 16.4% girls against 13% boys never eat breakfast. Furthermore, Merten et al. found that females also tend to
skip breakfast more than males during adolescence with OR=0.84 (95%
CI: 0.80 to 0.87) [26].
| Name of the variable                                      | Type            | Description                                                                 | Source                                      |
|-----------------------------------------------------------|-----------------|----------------------------------------------------------------------------|---------------------------------------------|
| Age                                                       | Continuous      | Age of the participant between 11 and 15 years                             | Adolescent questionnaire                    |
| Gender                                                    | Binary          | Male or female                                                              | Adolescent questionnaire                    |
| District                                                  | Nominal         | Jbeil, Kesrouan or Metn                                                     | Sample description                          |
| School location                                           | Nominal         | Altitude less than 500 m, between 500 m and 1000 m, or more than 1000 m    | Sample description                          |
| School Type                                               | Binary          | Private or public                                                           | Adolescent questionnaire                    |
| Grade                                                     | Nominal         | 7th, 8th or 9th grade                                                       | Adolescent questionnaire                    |
| Lebanese nationality                                     | Binary          | Yes or no                                                                   | Adolescent questionnaire                    |
| Number of persons per households                          | Nominal         | Less or equal than 3, between 4 and 6, or more than 6                      | Adolescent questionnaire                    |
| Father education level                                    | Nominal         | Lower, middle, or higher                                                    | Adolescent questionnaire                    |
| Mother education level                                    | Nominal         | Lower, middle, or higher                                                    | Adolescent questionnaire                    |
| Father occupational status                                | Nominal         | 1 Not working at the moment, 2 Part time work, 3 Full time work, 4 Retirement| Adolescent questionnaire                    |
| Parental income                                           | Nominal         | Lower, middle, or higher                                                    | Adolescent questionnaire                    |
| Parental morning presence                                 | Nominal         | Never, rarely, sometimes, most of the time, always                         | Adolescent questionnaire                    |
| parents/guardians food preparation                        | Nominal         | Never, rarely, sometimes, most of the time, always                         | Adolescent questionnaire                    |
| parents/guardians breakfast preparation                   | Nominal         | Never, rarely, sometimes, most of the time, always                         | Adolescent questionnaire                    |
| Feeling hungry because there was not enough food at home  | Nominal         | Never, rarely, sometimes, most of the time, always                         | Adolescent questionnaire                    |
| Location of eating breakfast                              | Nominal         | Never eat breakfast, home, on the way to school, or on the morning break    | Adolescent questionnaire                    |
| Eating breakfast in the last 7 days                       | Nominal         | Score between 0 and 7 days                                                  | Adolescent questionnaire                    |
| Reasons for skipping breakfast                            | Nominal         | Never skip breakfast, do not eat in the morning, does not have time, on diet, or there is no food at home | Adolescent questionnaire                    |
| Kind of usual breakfast                                   | Nominal         | Milk with ready-to-eat cereals, Sandwich, pastries/sweets, fruits or fruit juices, or coffee | Adolescent questionnaire                    |
| Meals per day                                             | Nominal         | Score between 1 to more than 6 meal/day                                     | Adolescent questionnaire                    |
| Skip lunch                                                | Nominal         | Never, rarely, sometimes, most of the time, always                         | Adolescent questionnaire                    |
| Eating pastries/sweets per day                            | Nominal         | Score between 0 to more than 5 times/day                                    | Adolescent questionnaire                    |
| Eating fruits/vegetables per day                          | Nominal         | Score between 0 to more than 5 times/day                                    | Adolescent questionnaire                    |
| Drinking milk per day                                     | Nominal         | Score between 0 to more than 3 times/day                                    | Adolescent questionnaire                    |
| Physical activity for more than 1 h/day                  | Binary          | 0 not physically active and 1 physically active for more than 3 days       | Adolescent questionnaire                    |
| Watching TV in a school day                               | Nominal         | Score between 0 to more than 5 hours/day                                    | Adolescent questionnaire                    |
| Playing video games or use computer in a school day       | Nominal         | Score between 0 to more than 5 hours/day                                    | Adolescent questionnaire                    |
| Sports team                                               | Nominal         | 0 or 1 team                                                                 | Adolescent questionnaire                    |
| Sleeping duration                                         | Nominal         | Less than 6 hours, between 6 and 8 hours, or more than 8 hours              | Adolescent questionnaire                    |
| Cigarette or Narguile                                     | Binary          | Yes or no                                                                   | Adolescent questionnaire                    |
| Alcohol                                                   | Binary          | Yes or no                                                                   | Adolescent questionnaire                    |
| SCOFF questionnaire                                       | Binary          | No eating disorder or at risk of eating disorders                           | SCOFF Adolescent questionnaire              |
| Chronic disease                                           | Binary          | Yes or no                                                                   | Adolescent questionnaire                    |
| Type of chronic disease                                   | Continuous      | Type                                                                       | Adolescent questionnaire                    |
| Medication                                                | Nominal         | Yes or no                                                                   | Adolescent questionnaire                    |
| If the participant on diet                                | Binary          | Yes or no                                                                   | Adolescent questionnaire                    |
| BMI for age Z-score                                       | Continuous      | z-score                                                                     | Anthropplus software                        |
| BMI for age Z-score                                       | Nominal         | From severe malnutrition to obese                                          | Anthropplus software                        |
| Energy intake                                              | Continuous      | Total calories derived from ASA 24 software                                | 24 hour recall                              |
| Energy intake before 10 am                                | Continuous      | Total calorie intake before 10 am derived from ASA 24 software             | 24 hour recall                              |
| Energy intake before 12 pm                                | Continuous      | Total calorie intake before 12 am derived from ASA 24 software             | 24 hour recall                              |
| Fat ratio                                                 | Continuous      | Calculated from total fat intake derived from ASA 24 software              | 24 hour recall                              |
| Carbohydrate ratio                                        | Continuous      | Calculated from total carbohydrate intake derived from ASA 24 software     | 24 hour recall                              |
| Protein ratio                                             | Continuous      | Calculated from total protein intake derived from ASA 24 software          | 24 hour recall                              |

Table 1: List of variables and their description.
Skipping breakfast in our sample is associated with many factors

Dietary behaviors and lifestyle factors: The majority of our sample tends to eat three to five meals per day. As for eating lunch, breakfast skippers tend to skip lunch more than eaters (17.6% and 8.7% consecutively) (Table 3). For milk consumption, the majority of breakfast skippers never drink milk (82.4%) (Table 3). Furthermore, there is an association between skipping breakfast and sleeping duration where skippers tend to sleep less than six hours per day (29.4%) more than eaters (12.2%) with p<0.05 (Table 5). Thus, similar to our findings, healthy behaviors were reported with the daily intake of breakfast [27].

Contradictory results were however found in our study when comparing with previous research. First, physical activity and television viewing were not associated to skipping breakfast. This result might be due to the absence of a universally acceptable method for assessing physical activity and sedentary behaviors in adolescents [28]. Second, eating disorders were not correlated in our sample to skipping breakfast with p>0.05. Thus, breakfast skipping could not be a useful marker in eating disorders for our study. Furthermore, the intake of fruits, vegetables, pastries and sweets were similar for adolescent that were skippers and non-skippers. This was not consistent in the literature [29]. This inconsistency might be explained by the changes in dietary behaviors among adolescents apart from breakfast eating.

SES: Socio-economic variables did not affect skippers as mentioned in the literature [29-31]. This could be due to the similarity in SES for the adolescent that tend to skip or not breakfast with majority of them had middle income. Shaw describes skipping breakfast as a matter of personal choice rather than influenced by SES [32]. However, the type of school has affected the consumption of breakfast where adolescents that attend public schools tend to skip breakfast more than adolescents studying in private schools with p<0.05 (Table 3). These results might be explained by less quality of education regarding healthy lifestyle in public schools. Furthermore, the frequency of parents preparing food for adolescents and specifically breakfast were strongly associated to breakfast skipping with p<0.001 (Table 3). The result from the present...
Citation: El-Chami M, Sacre Y, Matta J (2017) The Prevalence of Breakfast Skipping and its Association with Lifestyle Factors and Weight in 11-15 years Adolescents from Selected Lebanese Regions. Occup Med Health Aff 5: 260. doi: 10.4172/2329-6879.1000260

**Table 1:** Prevalence of skipping breakfast according to different definitions.

| Region         | Total sample N=404 (100%) | On average never eats in the morning N=34 | Eat breakfast at home, on way to school or on morning school breaks N=370 | Significance |
|----------------|---------------------------|-----------------------------------------|--------------------------------------------------------------------|--------------|
| Jbeil          | 60 (14.9%)                | 6 (10.0%)                               | 54 (90.0%)                                                        | \( \chi^2 = 1.925 \)  \( p = 0.382 \) |
| Kesrouan       | 164 (40.6%)               | 10 (6.1%)                               | 154 (93.9%)                                                       |              |
| Metn           | 180 (44.6%)               | 18 (10.0%)                              | 162 (90.0%)                                                       | \( \chi^2 = 5.611 \)  \( p = 0.020 \) |
| School type    |                           |                                         |                                                                   |              |
| Public         | 324 (80.2%)               | 12 (15.0%)                              | 312 (85.0%)                                                       |              |
| Private        | 80 (19.8%)                | 22 (8.8%)                               | 80 (25.0%)                                                        | \( \chi^2 = 0.069 \)  \( p = 0.516 \) |
| Nationality    |                           |                                         |                                                                   |              |
| Lebanese       | 384 (95%)                 | 32 (8.3%)                               | 352 (91.7%)                                                       | \( \chi^2 = 8.663 \)  \( p = 0.000 \) |
| Else           | 20 (5%)                   | 2 (10.0%)                               | 18 (90.0%)                                                        |              |
| Meals per day  |                           |                                         |                                                                   |              |
| Less than 3 meals | 29 (7.2%)               | 9 (27.3%)                               | 20 (6.4%)                                                        | \( \chi^2 = 29.665 \)  \( p = 0.000 \) |
| Between 3 and 5 meals | 309 (76.5%)       | 22 (66.7%)                              | 287 (77.8%)                                                       |              |
| More or equal than 6 meals | 64 (16.3%)          | 2 (6%)                                  | 62 (16.8%)                                                        |              |
| Skipping lunch |                           |                                         |                                                                   |              |
| Never          | 179 (44.3%)               | 9 (25.5%)                               | 170 (48.6%)                                                       | \( \chi^2 = 4.429 \)  \( p = 0.035 \) |
| Rarely         | 107 (26.5%)               | 5 (14.7%)                               | 102 (27.7%)                                                       |              |
| Sometimes      | 60 (14.9%)                | 7 (20.6%)                               | 53 (14.4%)                                                        |              |
| Most of the time | 18 (4.6%)               | 7 (20.6%)                               | 11 (3%)                                                          | \( \chi^2 = 8.663 \)  \( p = 0.000 \) |
| Always         | 38 (9.4%)                 | 6 (17.6%)                               | 32 (8.7%)                                                        |              |
| Eat sweet and pastries |             |                                         |                                                                   |              |
| 0 times/day    | 16 (4%)                   | 3 (8.8%)                                | 13 (3.5%)                                                        | \( \chi^2 = 5.546 \)  \( p = 0.0476 \) |
| 1 times/day    | 117 (29%)                 | 10 (24.4%)                              | 107 (29.1%)                                                       |              |
| 2 times/day    | 117 (29%)                 | 10 (24.4%)                              | 107 (29.1%)                                                       |              |
| 3 times/day    | 68 (16.9%)                | 7 (20.6%)                               | 61 (16.5%)                                                       |              |
| 4 times/day    | 33 (8.2%)                 | 1 (2.9%)                                | 32 (8.6%)                                                        |              |
| 5 times/day    | 16 (4%)                   | 0 (0%)                                  | 16 (4.3%)                                                        |              |
| More than 5 times/day | 27 (6.7%)            | 3 (8.8%)                                | 24 (6.5%)                                                        |              |
| Eat fruits and vegetables |             |                                         |                                                                   |              |
| 0 times/day    | 34 (8.4%)                 | 5 (14.7%)                               | 29 (7.8%)                                                        | \( \chi^2 = 6.375 \)  \( p = 0.0243 \) |
| 1 time/day     | 120 (29.7%)               | 13 (38.2%)                              | 107 (28.9%)                                                       |              |
| 2 times/day    | 95 (23.4%)                | 5 (14.7%)                               | 90 (24.3%)                                                       |              |
| 3 times/day    | 82 (20.3%)                | 6 (17.6%)                               | 76 (20.5%)                                                       |              |
| 4 times/day    | 36 (8.9%)                 | 4 (11.8%)                               | 32 (8.6%)                                                        |              |
| 5 times/day    | 21 (5.2%)                 | 0 (0%)                                  | 21 (5.7%)                                                        |              |
| More than 5 times/day | 16 (4.0%)              | 1 (2.9%)                                | 15 (4.1%)                                                        |              |
| Drinking milk  |                           |                                         |                                                                   |              |
| 0 times/day    | 206 (51%)                 | 28 (82.4%)                              | 178 (48.1%)                                                       | \( \chi^2 = 15.934 \)  \( p = 0.001 \) |
| 1 time/day     | 168 (41.6%)               | 6 (17.6%)                               | 162 (43.8%)                                                       |              |
| 2 times/day    | 30 (7.4%)                 | 0 (0%)                                  | 30 (8.1%)                                                        |              |
| Number of persons per households |             |                                         |                                                                   |              |
| Less or equal than 3 | 20 (5.0%)               | 3 (8.8%)                                | 17 (4.6%)                                                        | \( \chi^2 = 2.176 \)  \( p = 0.337 \) |
| Between 4 and 6 | 331 (81.9%)             | 25 (73.5%)                              | 306 (83.2%)                                                       |              |
| More than 6    | 51 (12.6%)                | 6 (17.6%)                               | 45 (12.2%)                                                       |              |

**Figure 1:** Prevalence of skipping breakfast according to different definitions.
Table 3: Demographics, SES and behavioral change among study participants.

| Variable                          | Total sample N=404 | Male N=203 | Female N=201 | Significance |
|-----------------------------------|--------------------|------------|--------------|--------------|
| Location of eating breakfast      |                    |            |              |              |
| On average never eats in the morning | 34 (8.4%) | 9 (4.4%) | 25 (12.4%) | χ²=8.395  p=0.003 |
| Eat breakfast at home, on way to school or on morning school breaks | 370 (91.6%) | 194 (95.6%) | 176 (87.6%) |              |
| On average skipping breakfast more than 1 day per week |                   |            |              |              |
| Skippers                          | 173 (42.8%)        | 99 (48.8%) | 74 (36.8%)  | χ²=5.893  p=0.010 |
| Eaters                            | 231 (57.2%)        | 104 (51.2%) | 127 (63.2%) |              |
| On average skipping breakfast more than 3 days per week |                    |            |              |              |
| Skippers                          | 132 (32.7%)        | 55 (27.1%) | 77 (38.3%)  | χ²=5.775  p=0.011 |
| Eaters                            | 272 (67.3%)        | 148 (72.9%) | 124 (61.7%) |              |

Father education

| Education Level | N (Percentage) | Male (Percentage) | Female (Percentage) | Significance |
|-----------------|----------------|------------------|--------------------|--------------|
| Lower           | 87 (21.5%)     | 12 (38.7%)       | 75 (20.9%)         | χ²=5.207  p=0.074 |
| Middle          | 212 (52.5%)    | 13 (41.9%)       | 199 (55.6%)        |              |
| Higher          | 90 (22.3%)     | 6 (19.4%)        | 84 (23.5%)         |              |

Mother education

| Education Level | N (Percentage) | Male (Percentage) | Female (Percentage) | Significance |
|-----------------|----------------|------------------|--------------------|--------------|
| Lower           | 71 (17.6%)     | 10 (31.2%)       | 61 (16.7%)         | χ²=4.244  p=0.120 |
| Middle          | 204 (50.5%)    | 144 (3.8%)       | 190 (52.1%)        |              |
| Higher          | 122 (30.2%)    | 8 (25.0%)        | 114 (31.2%)        |              |

Father occupation

| Occupation Type    | N (Percentage) | Male (Percentage) | Female (Percentage) | Significance |
|--------------------|----------------|------------------|--------------------|--------------|
| Not working at the moment | 3 (0.7%) | 0 (0%) | 3 (0.8%) | χ²=1.713  p=0.788 |
| Part time work     | 69 (17.1%)    | 4 (12.5%)        | 65 (18.0%)         |              |
| Full time work     | 284 (65.3%)   | 24 (75.0%)       | 240 (66.5%)        |              |
| Retirement         | 7 (1.7%)      | 0 (0%)           | 7 (1.9%)           |              |
| Other              | 90 (22.3%)    | 6 (19.4%)        | 84 (23.5%)         |              |

Mother occupation

| Occupation Type    | N (Percentage) | Male (Percentage) | Female (Percentage) | Significance |
|--------------------|----------------|------------------|--------------------|--------------|
| Not working at the moment | 257 (63.6%) | 18 (52.9%)       | 239 (64.6%)        | χ²=8.388  p=0.078 |
| Part time work     | 72 (17.8%)    | 5 (14.7%)        | 67 (18.1%)         |              |
| Full time work     | 64 (15.8%)    | 8 (23.5%)        | 56 (15.1%)         |              |
| Retirement         | 1 (0.2%)      | 0 (0%)           | 1 (0.3%)           |              |
| Other              | 10 (2.5%)     | 3 (8.8%)         | 7 (1.9%)           |              |

Parental income

| Income Level | N (Percentage) | Male (Percentage) | Female (Percentage) | Significance |
|-------------|----------------|------------------|--------------------|--------------|
| Lower       | 2 (0.5%)       | 0 (0.0%)         | 2 (0.5%)           |              |
| Middle      | 375 (93.6%)    | 33 (97.1%)       | 342 (94.2%)        |              |
| Higher      | 20 (5.0%)      | 1 (2.9%)         | 19 (5.2%)          |              |

Parental morning presence

| Presence Type   | N (Percentage) | Male (Percentage) | Female (Percentage) | Significance |
|-----------------|----------------|------------------|--------------------|--------------|
| Never           | 2 (0.5%)       | 0 (0.0%)         | 2 (0.5%)           | χ²=3.202  p=0.525 |
| Rarely          | 11 (2.7%)      | 0 (0.0%)         | 11 (3.0%)          |              |
| Sometimes       | 41 (10.1%)     | 5 (14.7%)        | 36 (9.8%)          |              |
| Most of the time| 58 (14.4%)     | 7 (20.6%)        | 51 (13.9%)         |              |
| Always          | 290 (71.8%)    | 22 (64.7%)       | 268 (72.8%)        |              |

Frequency of parents preparation of food

| Preparation Frequency | N (Percentage) | Male (Percentage) | Female (Percentage) | Significance |
|-----------------------|----------------|------------------|--------------------|--------------|
| Never                 | 3 (0.7%)       | 0 (0.0%)         | 3 (0.8%)           | χ²=10.567  p=0.032 |
| Rarely                | 6 (1.5%)       | 0 (0.0%)         | 6 (1.6%)           |              |
| Sometimes             | 23 (5.7%)      | 6 (17.6%)        | 17 (4.6%)          |              |
| Most of the time      | 74 (18.3%)     | 6 (17.6%)        | 68 (18.4%)         |              |
| Always                | 298 (73.8%)    | 22 (64.7%)       | 276 (74.6%)        |              |

Frequency of parents preparation of breakfast

| Preparation Frequency | N (Percentage) | Male (Percentage) | Female (Percentage) | Significance |
|-----------------------|----------------|------------------|--------------------|--------------|
| Never                 | 41 (10.1%)     | 10 (29.4%)       | 31 (8.4%)          | χ²=30.423  p=0.000 |
| Rarely                | 24 (5.9%)      | 4 (11.8%)        | 20 (5.4%)          |              |
| Sometimes             | 70 (17.3%)     | 8 (23.5%)        | 62 (16.8%)         |              |
| Most of the time      | 57 (14.1%)     | 8 (23.5%)        | 49 (13.3%)         |              |
| Always                | 211 (52.2%)    | 4 (11.8%)        | 207 (56.1%)        |              |

Food security

| Security Level   | N (Percentage) | Male (Percentage) | Female (Percentage) | Significance |
|-----------------|----------------|------------------|--------------------|--------------|
| Never           | 349 (86.4%)    | 30 (88.2%)       | 319 (86.2%)        | χ²=3.070  p=0.546 |
| Rarely          | 39 (9.7%)      | 2 (5.9%)         | 37 (10.0%)         |              |
| Sometimes       | 12 (3.0%)      | 1 (2.9%)         | 11 (3.0%)          |              |
| Most of the time| 3 (0.7%)       | 1 (2.9%)         | 2 (0.5%)           |              |
| Always          | 1 (0.2%)       | 0 (0.0%)         | 1 (0.3%)           |              |
On average skipping breakfast more than 6 days per week

| Group             | Prevalence | 11-15  | 12-13  | 14-15  | χ²/p Value |
|-------------------|------------|--------|--------|--------|------------|
| Skippers          | 50 (12.4%) | 18 (8.9%) | 32 (15.9%) | 4.633/0.022 |
| Eaters            | 354 (87.6%) | 185 (91.1%) | 169 (84.1%) |         |

On average breakfast calories before 10 am

| Group             | Prevalence | 11-15  | 12-13  | 14-15  | χ²/p Value |
|-------------------|------------|--------|--------|--------|------------|
| Skippers (0 calories) | 128 (31.7%) | 62 (30.5%) | 66 (32.8%) | 0.246/0.620 |
| Eaters (≥ 1 calories) | 276 (68.3%) | 141 (69.5%) | 135 (67.2%) |         |

On average breakfast calories before 12 am

| Group             | Prevalence | 11-15  | 12-13  | 14-15  | χ²/p Value |
|-------------------|------------|--------|--------|--------|------------|
| Skippers (0 calories) | 47 (11.6%) | 22 (10.8%) | 25 (12.4%) | 0.252/0.616 |
| Eaters (≥ 1 calories) | 357 (88.4%) | 181 (89.2%) | 176 (87.6%) |         |

Main reasons for skipping breakfast

| Reason                      | Prevalence | 11-15  | 12-13  | 14-15  | χ²/p Value |
|-----------------------------|------------|--------|--------|--------|------------|
| Always eat breakfast        | 192 (47.9%) | 108 (53.7%) | 84 (42.0%) | 12.640/0.007 |
| Cannot eat in the morning   | 76 (19.0%) | 32 (15.9%) | 44 (22.0%) |         |
| No time for breakfast       | 52 (13%)   | 27 (13.4%) | 25 (12.5%) |         |
| On diet                     | 20 (5%)    | 4 (2%)  | 16 (8%)  |         |
| Other reason                | 25 (6.2%)  | 11 (5.5%) | 14 (7%)  |         |
| Don't know                  | 36 (9%)    | 19 (9.5%) | 17 (8.5%) |         |

Kind of usual breakfast

| Breakfast                     | Prevalence | 11-15  | 12-13  | 14-15  | χ²/p Value |
|-------------------------------|------------|--------|--------|--------|------------|
| Milk with cereals             | 103 (26.5%) | 54 (27.6%) | 49 (26.2%) | 8.663/0.193 |
| Sandwich                      | 166 (43.3%) | 81 (41.3%) | 85 (45.5%) |         |
| Pastries /sweets              | 32 (8.4%)  | 19 (9.7%) | 13 (7.0%)  |         |
| Fruit and fruit juices        | 15 (3.9%)  | 7 (3.6%)  | 8 (4.3%)  |         |
| Coffee                        | 38 (9.9%)  | 22 (11.2%) | 16 (8.6%)  |         |
| Other                         | 23 (6.0%)  | 13 (6.6%) | 10 (5.3%)  |         |
| Don't know                    | 6 (1.6%)   | 0 (0%)   | 6 (3.2%)  |         |

Table 4: Prevalence of skipping breakfast according to different definitions in the literature.

study supports the literature for this positive association [33]. Thus, parents could play an important role in adolescents’ dietary behavior.

Linear regression model non-adjusted or adjusted did not find any association between BMI-for-age and skipping breakfast, even though various definitions were taken into consideration and different confounders were examined as well with p>0.05 (Tables 6 and 7).

Many studies in the literature have found a correlation between breakfast intake and weight [5,8]. Several studies have found also no association between breakfast skipping and weight changes [7,11,25,34]. This inconsistency in results might be explained by the absence of a standardized definition for skipping breakfast. Finally, fat intake and carbohydrate intake were positively correlated to BMI-for-age with p<0.05, but no association was found while adjusting to total energy intake. Linear regression model non-adjusted or adjusted did not find any association between BMI-for-age and skipping breakfast, even though various definitions were used to describe breakfast skipping, several definitions were used to describe breakfast skipping and its prevalence varied widely between these definitions [36].

On the other hand, the usage of one single 24-hour recall might not reflect the real intake of the adolescents’ population. Multiple 24-hour recalls for the individual are required. Moreover, 24-hour recall reliance on memory might be another limitation besides errors in data collection and the absence of a Lebanese food database.

Finally, this study is the first national study examining breakfast skipping in relation with weight in Lebanon; a few Lebanese studies have studied skipping breakfast apart and overweight and obesity without searching for a relation between them. The strength of the current study relies in the questionnaire’s assessment of a multitude of covariates. Not to mention that, this study assessed skipping breakfast using different definitions that allows for more accurate comparison. However, those results could only be generated to the region where this study was conducted; due to small sampling size that does not represent the entire Lebanese adolescent population.

Conclusion

Prevalence of breakfast skipping and on the other hand overweight and obesity among adolescents has been on the rise in the last few decades. The relation between these two phenomena however remains complex. Due to the importance of regularity in breakfast consumption on nutritional quality of the diet and the improvement in academic performance and psychosocial functioning, the purpose of the current study was to estimate the prevalence of skipping breakfast among 11–15 years old adolescents living in Lebanon and identifying whether there is an association between breakfast patterns and BMI-for-age taking into consideration confounders [37].

According to this study, the prevalence of overweight and obesity were high attaining 25% overweight and 19% obesity among adolescents. In contrast to the absence of a specific definition of breakfast skipping, several definitions were used to describe breakfast skipping and its prevalence varied widely between these definitions from 8.4% till 42.8%.

In an attempt to identify the correlation between breakfast and weight, this analysis found no association between the components despite taking into consideration the various definitions and confounders.

As for dietary intake, fat and carbohydrate were positively associated with BMI-for-age (p<0.05) contrary to energy intake where there was...
no association.

Skipping breakfast was correlated with the school type, parental preparation of food specifically breakfast, sleeping duration, a lower consumption of milk, skipping lunch more often and eating fewer meals per day.

**Table 5:** Association between Prevalence of skipping breakfast and lifestyle factors.

| Definition | N Eaters Mean ± SD eaters | N Skippers Mean ± SD Skippers | β ± SE | p value |
|------------|---------------------------|--------------------------------|--------|---------|
| On average skip 1 morning/week | 173 | 0.74 ± 1.22 | 231 | 0.84 ± 1.14 | 0.094 ± 0.119 | 0.431 |
| On average skip 3 mornings/week | 272 | 0.78 ± 1.22 | 132 | 0.83 ± 1.12 | 0.049 ± 0.126 | 0.700 |
| On average skip 6 mornings/week | 354 | 0.78 ± 1.19 | 50 | 0.92 ± 1.19 | 0.144 ± 0.179 | 0.423 |
| On average never eats in the morning | 370 | 0.78 ± 1.20 | 34 | 0.93 ± 0.99 | 0.098 ± 0.064 | 0.121 |

**Table 6:** ANOVA regression not corrected for covariates showing the association with BMI and skipping breakfast.

**Table 7:** Linear non adjusted showing association with BMI and skipping breakfast.

| Location of eating breakfast | Location of eating breakfast | Location of eating breakfast | Location of eating breakfast | Location of eating breakfast | Location of eating breakfast | Location of eating breakfast | Location of eating breakfast |
|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| On average never eats in the morning | On average never eats in the morning | On average never eats in the morning | On average never eats in the morning | On average never eats in the morning | On average never eats in the morning | On average never eats in the morning | On average never eats in the morning |
| Eating disorders | Eating disorders | Eating disorders | Eating disorders | Eating disorders | Eating disorders | Eating disorders | Eating disorders |
| Exercise | Exercise | Exercise | Exercise | Exercise | Exercise | Exercise | Exercise |
| Gender | Gender | Gender | Gender | Gender | Gender | Gender | Gender |
| Pearson correlation | p-value | Pearson correlation | p-value | Pearson correlation | p-value | Pearson correlation | p-value |
| Fat intake | 0.687 | 0.02 | 0.687 | 0.02 | 0.687 | 0.02 | 0.687 | 0.02 |
| Carbohydrates intake | 0.856 | 0.009 | 0.856 | 0.009 | 0.856 | 0.009 | 0.856 | 0.009 |
| Total energy | 0.067 | 0.091 | 0.067 | 0.091 | 0.067 | 0.091 | 0.067 | 0.091 |

**Table 8:** Correlation between macronutrient intake and BMI-for-age.
based on large representative samples of the entire Lebanese population in all districts addressing the high prevalence and causes of overweight and obesity [38] and their possible relation to breakfast consumption in Lebanon [39].

Conflict of Interest

The following is a research article in which all participating authors meet the uniform requirements of the Occupational Medicine and Health Affairs criteria for authorship.

This work was approved by the ethics committee at the Holy Spirit University, it was not sponsored by any organization, and there were no conflict of interest regarding this work.

References

1. Levy LZ, Petty K (2008) Childhood obesity prevention: Compelling challenge of the twenty-first century. Early Child Dev Care 178: 609-615.
2. Newby PK (2007) Are dietary intakes and eating behaviors related to childhood obesity? A comprehensive review of the evidence. J Law Med Ethics 35: 35-60.
3. http://www.euro.who.int/__data/assets/pdf_file/0005/96980/2.3.-Prevalence-of-overweight-and-obesity-EDITED_layouted_V3.pdf
4. Vanhala M, Korpelainen R, Tapanainen P, Kaikkonen K, Kaikkonen H, et al. (2009) Lifestyle risk factors for obesity in 7-year-old children. Obes Res Clin Pract 3: 99-107.
5. Rampersaud GC, Pereira MA, Girard BL, Adams J, Metzl JD (2005) Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. J Am Diet Assoc 105: 743-760.
6. Hoyland A, Lawton C, Dye L (2008) Influence of breakfast on cognitive performance, appetite and mood in healthy young adults. Appetite 50: 560.
7. Nicklas TA, Yang SJ, Baranowski T, Zakeri I, Berenson G (2003) Eating patterns and obesity in children: The Bogalusa Heart Study. American journal of preventive medicine 25: 9-16.
8. Horikawa C, Kodama S, Yachi Y, Heianza Y, Hiraiwa R, et al. (2011) Skipping breakfast and prevalence of overweight and obesity in Asian and Pacific regions: a meta-analysis. Prev Med 53: 260-267.
9. Fertig A, Grimm G, Tchernia G (2009) The connection between maternal employment and childhood obesity: inspecting the mechanisms. Rev Econ Househ 7: 227.
10. Giovannini M, Agostoni C, Shamir R (2010) Symposium overview. Do we all eat breakfast and is it important? Crit Rev Food Sci Nutr 50: 97-99.
11. Alabakhal B, Shawky S (2002) Prevalence of daily breakfast intake, iron deficiency anaemia and awareness of being anaemic among Saudi school students. Int J Food Sci Nutr 53: 519-528.
12. Williams P (2007) Breakfast and the diets of Australian children and adolescents: An analysis of data from the 1995 National Nutrition Survey. Int J Food Sci Nutr 58: 201-216.
13. Deeb ME, Awwad J, Yeretzian JS, Kaspar HG (2003) Prevalence of reproductive tract infections, genital prolapse, and obesity in a rural community in Lebanon. Bull World Health Organ 81: 639-645.
14. Sibai AM, Hwalla N, Adra N, Rahal B (2003) Prevalence and covariates of obesity in Lebanon: Findings from the first epidemiological study. Obst Res 11: 1353-1361.
15. http://www.who.int/dietphysicalactivity/childhood/en/
16. Salameh P, Barbour B, Issa C, Rachidi S (2011) Obesity associated behavior in adolescents of private schools in Lebanon. J Med Liban 59: 179-190.
17. Center for Educational Research and Development, Lebanon (2012) Statistical Bulletin for the academic year 2011 – 2012. Ministry of Education and Higher Education, Republic of Lebanon. Beirut: Educational center for research and development.
18. http://www.who.int/growthref/who2007_height_for_age/en/
19. National Cancer Institute. (2011). About Us: Risk Factor Monitoring and Methods. Retrieved May 17, 2013, from National Cancer Institute, U.S National Institute of Health.
20. CDC (2011) About Us: 2011 Middle School Youth Risk Behavior Survey questionnaire. Retrieved May 17 from Centers for Disease Control and Prevention.
21. Hautala L, Junnila J, Alin J, Grönroos M, Maunula AM, et al. (2009) Uncovering hidden eating disorders using the SCOFF questionnaire: Cross-sectional survey of adolescents and comparison with nurse assessments. Int J Nurs Stud 46: 1439-1447.
22. Muro-Sans P, Amador-Campos JA, Morgan JF (2008) The SCOFF-c: psychometric properties of the Catalan version in a Spanish adolescent sample. J Psychosom Res 64: 81-86.
23. Cheng TS, Tse LA, Yu IT, Griffiths S (2008) Children’s perceptions of parental attitude affecting breakfast skipping in primary sixth-grade students. Journal of School Health 78: 203-208.
24. Berkey CS, Rockett HR, Gillman MW, Field AE, Colditz GA (2003) Longitudinal study of skipping breakfast and weight change in adolescents. Int J Obes 27: 1259-1266.
25. Dialektakou KD, Vranas PB (2008) Breakfast skipping and body mass index among adolescents in Greece: whether an association exists depends on how breakfast skipping is defined. J Am Diet Assoc 108: 1517-1525.
26. Merten MJ, Williams AL, Shriner LH (2009) Breakfast consumption in adolescence and young adulthood: parental presence, community context, and obesity. J Am Diet Assoc 109: 1384-1391.
27. Keski-Rahkonen A, Kaprio J, Rissanen A, Virkkunen M, Rose RJ (2003) Breakfast skipping and health-compromising behaviors in adolescents and adults. Eur J Clin Nutr 57: 842-853.
28. Kohl HW, Fulton JE, Caspersen CJ. Assessment of physical activity among children and adolescents: A review and synthesis. Prev Med 31: S54-S76.
29. Tin SP, Ho SY, Mak KH, Wan KL, Lam TH (2011) Breakfast skipping and change in body mass index in young children. Int J Obes 35: 899-906.
30. Sjöberg, Hallberg L, Höglund D, Hultén L (2003) Meal pattern, food choice, nutrient intake and lifestyle factors in The Göteborg Adolescence Study. Eur J Clin Nutr 57: 1569-1578.
31. Timlin MT, Pereira MA, Story M, Neumark-Sztainer D (2008) Breakfast eating and weight change in a 5-year prospective analysis of adolescents: Project EAT (Eating Among Teens). Pediatrics 121: e638-e645.
32. Shaw ME (1998) Adolescent breakfast skipping: an Australian study. Adolescence 33: 851-862.
33. Pearson N, Biddle SJ, Gorely T (2009) Family correlates of breakfast consumption among children and adolescents. A systematic review. Appetite 52: 1-7.
34. Resnicow K (1991) The relationship between breakfast habits and plasma cholesterol levels in schoolchildren. Journal of School Health 61: 81-85.
35. Bandini LG, Schoeller DA, Cyn CN, Dietz WH (1990) Validity of reported energy intake in obese and nonobese adolescents. Am J Clin Nutr 52: 421-425.
36. Cartwright M, Wardle J, Steggle N, Simon AE, Croker H, et al. (2003) Stress and dietary practices in adolescents. Health Psychol 22: 362.

37. Nicklas TA, Bao W, Webber LS, Berenson GS (1993) Breakfast consumption affects adequacy of total daily intake in children. J Am Diet Assoc 93: 886-891.

38. Kanter R, Caballero B (2012) Global gender disparities in obesity: A review. Adv Nutr 3: 491-498.

39. Levin KA, Kirby J, Currie C (2012) Family structure and breakfast consumption of 11-15 year old boys and girls in Scotland, 1994-2010: a repeated cross-sectional study. BMC public health 12: 228.