



## Breakfast and Snack Patterns among Iranian Children and Adolescents: A Systematic Review

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### Abstract

**Background:** Breakfast is the most important meal of the day, but many children and adolescents miss the morning meal every day. This study aimed to investigate the pattern of breakfast and snack consumption and their effective factors among primary and high school students in Iran.

**Materials and Methods:** In this systematic review, two independent researchers have selected articles that reported the status of breakfast and snacks among the students in the Scopus, EMBASE, Cochrane library, Web of Science, CINAHL, Medline, CIVILICA databases, and Google Scholar search engine, without time restrictions up to July 2022.

**Results:** 21 studies with 45,778 children and adolescents were included. Results showed that 32.2% (9.3-32.2), and 32.08% (2.1-32.08) of school-children and high-school students skipped breakfast, respectively. 97.7% (10.5-97.7) of children and 92.8% (17.3-92.8) of adolescents reported regularly breakfast. The midmorning snacks intake was reported among 97.7% (13-97.7) of children and 96.2% (48.6-96.2) of adolescents. The most important reasons for missing breakfast were low appetite, late waking up in the morning, non-flavored foods, and inattention of mothers. Moreover, a significant relationship was found between snack consumption and maternal age, maternal educational level, gender, urban inhabitants and birth order of the students ( $p < 0.045$ ). There was an inverse relationship between students' age, economic situation and breakfast consumption ( $P = 0.01$  and  $r = -0.143$ ).

**Conclusion:** Breakfast skipping and snack consumption were frequent among children and adolescents. The most important reasons for missing breakfast were low appetite, late waking up in the morning, non-flavored foods, and inattention of mothers. It is needed to conduct the schools health promotion programs for parents and students to encourage students to eat healthy breakfast and healthy snacks.

**Key Words:** Children, Adolescents, Iran, Breakfast, Snack.

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## 1- INTRODUCTION

Breakfast is the first meal of the day usually eaten in the morning (1). The word in English refers to breaking the fasting period of the previous night (2). Various "typical" or "traditional" breakfast menus exist, with food choices varying by regions and traditions worldwide. Nutrition is one of the most effective factors in creating and maintaining health and it varies depending on the type of activity of children and adolescents. Childhood and adolescence are two key periods in the formation of nutritional habits of people throughout life (3, 4). On the other hand, nutrition, especially eating breakfast, can be mentioned as an important factor in the health and academic success of students, so that not eating breakfast is associated with a decrease in accuracy and mental concentration and academic failure. On the other hand, its removal can cause a decrease in the amount of nutrients available to the brain and ultimately a decline in cognitive function (5).

The results of a study in the country show that about 40% of the country's children do not eat breakfast (4). But breakfast is known as the most important daily meal and its regular consumption has an effect on people's physical, mental and social health. However, this food promise is ignored by children and teenagers more than other promises (6, 7). The amount of skipping breakfast is different in different populations (8). Children and adolescents who skip breakfast tend to have poorer nutrient intakes than those who eat breakfast (9-11). Eating breakfast regularly has been linked with greater intake of fiber, calcium, iron, vitamin C, and other vitamins and minerals, and lower intake of fat, cholesterol, and sodium (12-14). Breakfast skipping among children and adolescents is associated with a number of poor health outcomes and health-compromising behaviors, including higher

blood cholesterol and insulin levels, smoking, alcohol use, physical inactivity, disordered eating, and unhealthy weight management practices (15-20). When students miss a healthy morning meal, they go to class hungry. Hunger is associated with lower physical activity, stomachaches, headaches, depression, anxiety and a decreased ability to focus (21). Also, children and adolescents experiencing hunger have lower math scores, poorer grades, and are more likely to repeat a grade (22, 23). Studies show that students who do not have enough appetite and opportunity to eat breakfast show up in the classroom impatiently and will not show interest in learning due to fatigue (24, 25); these students use snacks at school to satisfy their hunger. High consumption of low-value food in children and adolescents causes consequences such as obesity, tooth decay and chronic diseases (26). Proper nutrition and appropriateness of the food program is one of the necessary conditions to maintain the health of children, especially at school age, due to their greater vulnerability, forming a high percentage of the country's population, and the higher effectiveness of health-therapeutic interventions (27, 28).

Therefore, good nutrition, especially eating breakfast, is a very important factor in human progress in society. One of the indicators of social well-being is the state of nutrition and well-being of the society, and the lack of proper nutrition causes the growth of children and adolescents, the spread of disease, the reduction of physical and intellectual capacity, depression, etc. in students. Therefore, in line with the government's policies to improve and improve nutrition in the target groups, especially students, knowing the patterns of children and adolescents receiving breakfast and the reasons for skipping it during school is of particular importance for health care providers. On the other hand, the statistics are different in different

regions of the country and the need for a comprehensive review that reviews different studies and determines the prevalence of breakfast consumption and the reasons for its omission in different age groups of students is felt. This study aimed to investigate and review the pattern of breakfast and snack consumption and their effective factors among primary and high school students in Iran.

## 2- MATERIALS AND METHODS

The Preferred Reporting Items for Systematic review and Meta-Analysis (PRISMA) statement was used as the template for this review (29).

### 2-1. Eligibility criteria

The participants, interventions, comparators, and outcomes (PICO), as a framework, was used to formulate the review objective and inclusion criteria.

**2-1-1. Participants:** Iranian primary and high school students (6-19 years old).

**2-1-2. Interventions:** The included studies are non-interventional, so an intervention group did not exist.

**2-1-3. Comparison:** The study did not have a comparison group.

**2-1-4. Outcome:** Breakfast consumption/skipping and snack consumption.

**2-2. Included studies:** The review included studies containing any form of quantitative assessment, measurement, and evaluation of breakfast consumption/skipping and snack consumption in primary and high school students only in Iran published up to July 2022, written in English or Persian.

**2-3. Exclusion criteria:** The exclusion criteria were abstracts without the full article, articles not written in English or Persian, review articles, systematic review and meta-analyses, letters to the editor,

editorials, short reports, case reports, and briefs.

### 2-4. Information sources

A systemic search of electronic databases Medline (via PubMed), ProQuest, Scopus, Web of Science, Cochrane Library, CINAHL, CIVILICA, SID, Magiran, and Google Scholar search engine was conducted. The search was done independently by two reviewers, and any disagreement between the reviewers was resolved by the supervisor.

### 2-5. Search

The titles and abstracts of the identified records were initially screened for their relevance. When an article could not be rejected with certainty based on the title or abstract, the full text paper was retrieved for further evaluation. Keywords were obtained from MeSH and extracted from related articles. Search words were a combination of (Students, primary school children, elementary students, high school students, breakfast consumption, breakfast skipping, snack, snack consumption, junk food, and Iran).

### 2-6. Study selection

A database search was done for possible studies, abstracts were screened for eligible studies, full-text articles were obtained and assessed, and a final list of included studies was made. In addition to primary articles, their references were also searched for additional studies. This process was done independently and in duplication by two reviewers, and any disagreement was resolved by the third reviewer. References were organized and managed using EndNote software (version X8).

### 2-7. Data collection process

From each of the included studies, the following information was recorded in the data extraction table: first author's name, year of study, study design, study

population, study city/province, participant characteristics (age and sex), and the main results (Figure.1).

**2-8. Risk of bias in individual studies**

The risk of bias was assessed using the standard tool of STROBE (STrengthening the Reporting of Observational Studies in Epidemiology) positioning guidelines (30). STROBE is a valuable tool for evaluating the quality of observational studies. This checklist has 22 items, scored based on the importance of each item according to the present study. The final score of the checklist was 30, and the minimum score

was 15.0. The assessment was done by two reviewers independently and in duplication, and any discrepancies were resolved by the third reviewer.

**2-9. Synthesis of results**

Due to the difference in the included studies, study designs, age groups in studies, and sample size, a meta-analysis was not conducted.

**2-10. Ethics statement**

Ethical approval was not required for this study as it is a systematic review.

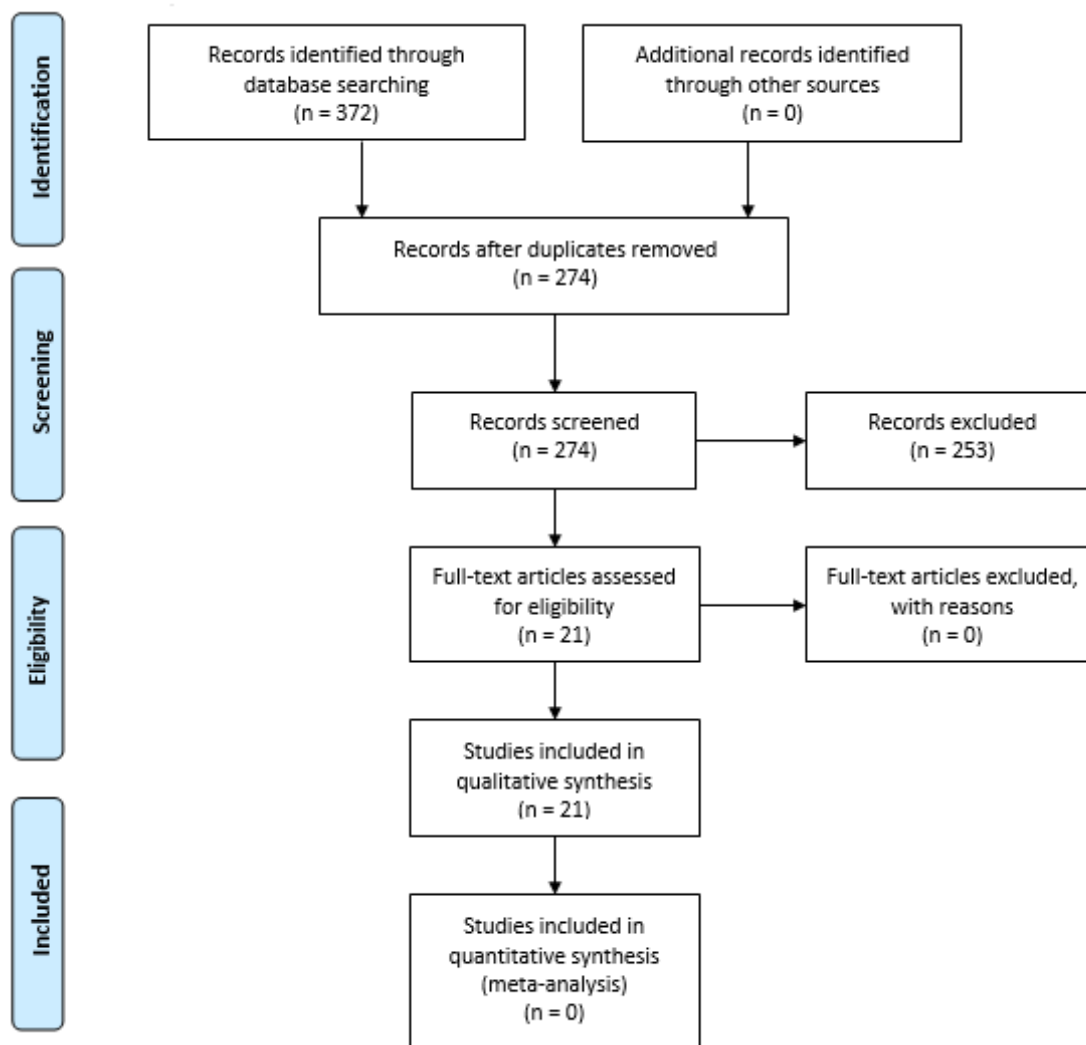


Fig.1: PRISMA Flowchart.

### 3- RESULTS

Students are the future builders of society and are in one of the most important periods of their development. The basis of the food pattern is formed in the early years of life, especially during childhood and adolescence, and is stabilized over time. Therefore, this period is the most appropriate time to identify nutritional problems and plan to improve the existing situation. Finally, 21 related studies including 45,778 children and adolescents (schoolchildren=10,599, and high school students=35,179) were selected (**Figure.1**). The main characteristics of the selected studies are summarized in **Table.1** and the following:

#### Summary of studies and their characteristics

**1.** In a descriptive study on 223 elementary fourth grade students in Zahedan (2012), aimed to determine the knowledge and perceived threat level of elementary school students about breakfast and snack consumptions, results showed that 51.6% of students reported that they were eating breakfast every day and 22% reported that they were consuming snack every day. Pearson test showed that the relationship between knowledge and perceived susceptibility and severity and behavior were positive and significant ( $p < 0.05$ ) (31).

**2.** In a descriptive-analytical study on 180 elementary students in Torbat heydariyeh (2014), aimed to determine the level of knowledge and perceived benefits and perceived barriers to in relation breakfast and snacks, results showed that 45.6% of students ate breakfast every day, and 10.4% of students went to school without breakfast and only 22.5% ate snack every day. Pearson test showed that the relationship between Knowledge and behavior perceived susceptibility and severity and behavior is positive and significant but this the relationship was not

observed between perceived benefits and the behavior (32).

**3.** In a descriptive-analytical study on 1300 students in primary schools of Qazvin (2007-2008), aimed to investigate pattern of breakfast and snack consumption and their effective factors among primary school students, results showed that 89.5% of students had eaten their breakfast before going to school. The most important reason for not having breakfast was late waking up in the morning. 85.4% of the students had bread and cheese and only 20.1% had milk for breakfast. In addition, only 8.5% of students have eaten no snack during school time. Cakes and cookies was the most frequent snack consumed (85.1 %) among students (33).

**4.** In a descriptive-analytic cross-sectional study aimed to investigate the factors affecting breakfast consumption in 312 elementary school students of Esfarayen (2017). The results showed that 97.7% of the students consumed breakfast and reported an average breakfast of  $6.11 \pm 1.3$  days a week. Most students tended to have breakfast with their families (86.5%), and 80.8% of them would like to have breakfast at home as well. The largest group of food consumed by students was the bread and grape group (50.5%), and the smallest group used was the fruit group (5.5%). The results showed a significant correlation between consumption protein in breakfast and daily breakfast consumption ( $p < 0.05$ ,  $r = 0.112$ ) (34).

**5.** In a cross-sectional study on 245 students from eight elementary schools of Gonbad (2013-2014), aimed to survey snack pattern and some of its associated factors among students in elementary schools, results showed that 97.7% of the students consumed snack. Biscuits, cakes, and cookies were the most frequently consumed snacks (49%). Moreover, a significant relationship was found between snack consumption and maternal age ( $p < 0.045$ ), maternal educational level

( $p < 0.001$ ), and birth order of the students ( $p < 0.045$ ) (35).

**6.** In a cross-sectional study on 360 primary school students (2017), aimed to investigate breakfast consumption behavior and self-efficacy, outcome expectations, evaluation and knowledge in elementary students. The results showed that the mean breakfast consumption (in a week) score of 2.4 with a standard deviation of 1.7. 10.5% of students were eating breakfast daily. There was a significant relationship between breakfast consumption and self-efficacy, outcome expectation and outcome evaluation ( $p < 0.001$ ). There was an inverse relationship between students' age, economic situation and breakfast consumption ( $p = 0.01$  and  $r = -0.143$ ). Multiple regression analysis showed there was a significant relationship between self-efficacy, type of school, and student age, and having breakfast and it predicted 24.3% of breakfast consumption variance (36).

**7.** In a descriptive study on 7,426 students from in urban and rural areas (2012), aimed to evaluate whether skipping breakfast had any effect among primary school children in the north of Iran. The results showed that on average, 91.7% of school children ate breakfast before going to school. Skipping breakfast were significant among 9.3% of students (female= 9.9% and male=6.7%) and in Turkman ethnic group (6.0%) were significantly less ( $p = 0.001$ ) than other ethnic groups such as Fars (9.6%) and Sistani (9.4%). The most important reasons for missing breakfast were low appetite (70.1%), non-flavored foods (11.8%), inattention of mothers (5.2%), and others factors (13%). In addition, the higher educational level of parents, good socio-economic condition and unemployed fathers were amongst the most important risk factors for skipping breakfast by schoolchildren in this region (37).

**8.** In a cross-sectional study on 298 schoolchildren of primary schools of Ilam city (2016), aimed to assess the eating breakfast status in a sample of primary students. The results showed that 32.2% of study schoolchildren skipped breakfast. There was a significant difference between boys and girls breakfast habit ( $p < 0.05$ ). Of these, 5% have never eaten breakfast. In addition, findings showed that 13.1% of the schoolchildren had not eaten anything at breakfast the morning before completing the questionnaire (38).

**9.** In a cross-sectional study on 155 primary school girls in Omidieh city (2015), aimed to evaluate breakfast and snack patterns of primary school girls in Omidieh, Khuzestan Province, Iran. The results showed that a satisfactory breakfast consumption pattern in the studied population as 79.5% of students reported that they regularly eat breakfast, during 14 days of study. In addition, 22% of students consume Junk foods including puffs, chips and candy while 13% of them consumed traditional snacks including dried fruits and nuts. The reason for not eating breakfast in 49% of students was lack of appetite. In terms of the type of breakfast, 28% of the students used bread, cheese, and tea, and 12% used traditional foods. Only 2.5% had consumed bread, cheese and walnuts (39).

**10.** In a case-control study on 100 girls from primary schools of Tehran (2010-2011), aimed to evaluate the association between educational achievement in relation to eating breakfast and snack among primary school children. So, 50 children who had the scores of less than 17 were randomly selected as the case group and 50 children with the score of more than 17 as the control group. The results showed that between the two study groups in terms of breakfast consumption (used or not), there was a statistically significant difference ( $p < 0.05$ ). 22% of participants in the case group reported that they typically

have breakfast, while this figure was 80% in the control group. Between the two groups in terms of daily consumption of snacks, there was significant difference ( $p < 0.0001$ ); so that 72% of the control group participants typically used the snack, as the 54% of cases that they would normally eat snacks. It's means children in case group consumed less breakfast and snack compared to control group ( $p < 0.05$ ) (40).

**11.** In a cross-sectional study was performed on 2,444 students aged 12-14 from 5 Iranian ethnicities (Arab, Kurdish, Sistani and Baluchi, Turkish and Turkmen), aimed to determine the status of breakfast and snacks among the students of five Iranian ethnicities in 2015. The results showed that the mean type of food at home was 2.2 for breakfast and the mean amount of snacks at school was 1.8. 17.3% of the students at home breakfast and 16.2% of students at the school did not consume any food. The least nutrition content group was the group of fruits and vegetables, and the highest nutrition was from the miscellaneous group. The quality of 16% of the received foods was poor. There was a significant relationship between the quantity and quality of foods consumed and the ethnic groups ( $p < 0.05$ ) (41).

**12.** In a descriptive study on 120 female students aimed to determine the knowledge, attitude and nutritional practice of female middle school students in district 4 of Isfahan (2008), results showed that 37.5% of students had poor nutritional knowledge, and 90% of the students had a poor nutritional practice. In all students, the daily consumption of bread and cereals was higher than other food groups. In this study, the average consumption of milk and dairy, meat, fruit and vegetable groups was lower than the minimum recommended for this age group. The most consumed snacks were fruits, cakes, and biscuits respectively (42).

**13.** In a descriptive-analytical study on 100 secondary school girl students (2009-2010), aimed to determine breakfast consumption and its predictors among Qom school girl students based on the Pender's health promotion model constructs. The results showed that only 25% of the studied students ate breakfast 7 days a week and 21% of students went to school without eating breakfast. On the basis of the Pender's health promotion model constructs and personal factors having a potentially significant correlation with behavior, 69% of the variability in breakfast consumption by the girl students ( $R^2 = 0.69$ ,  $F = 12.68$ ,  $p < 0.0001$ ) was predicted by the following variables: prior related behaviors, perceived barriers, self-efficacy, and competing demands and preferences (43).

**14.** In a cross sectional descriptive analytical study on 208 governmental middle schools (2013), aimed to determine dietary pattern, breakfast and snack in guidance school students in Ramsar, results showed that the main food group consumption of most participants (56.2%) were unsatisfactory. 92.8% of samples ate breakfast at home and 96.2% had snack in school. Samples always consumed milk products (34.1%) meat (10.6%), egg (13.9%), vegetables (17.4%) and fruits (34.1%). There was significant relationship between sex and frequency of milk, meat, egg and sours consumption ( $p < 0.05$ ) (44).

**15.** In a cross-sectional study aimed to determine the pattern of food consumption and physical activity among 450 high school students in the North Khorasan province, results showed that the prevalence of obesity was higher in girls in comparison with boys. Up to 60.2% and 64.5% of boys and 38.6% and 47.4% of girls in the morning and evening shift of the school eat breakfast during the weekdays, respectively (45).

**16.** In a secondary study in 2011-2012 in 30 provinces of Iran on 13,486 students



mean age of  $12.50 \pm 3.36$  years, data were obtained from the fourth national school-based surveillance survey entitled CASPIAN-IV study, aimed to assess the frequency of consuming different types of snacks among Iranian students according to socio-economic status (SES) of their living region. The results showed that fresh fruits were the most common used category of healthy snacks (55.74%). Boys had more daily consumption of milk (48.65% vs. 43.27%), and girls had more daily consumption of fresh fruits (58.07% vs. 53.47%). Urban residents had lower consumption of vegetables (30.53% vs. 37.55%), dried fruits (18.29% vs. 23.02%), and fresh fruits (45.33% vs. 50.09%) than their rural counterparts. Among unhealthy snacks, sweets had the highest daily consumption (34.15%). Boys had higher consumption of sweetened beverages (22.57% vs. 17.6%), and fast foods (3.51% vs. 2.17%). At national level, except than salty snacks (16.24% rural vs. 11.83% urban), consumption of other junk snacks had no significant difference between urban and rural residents (46).

**17.** In a study is part of an epidemiological survey on 2,302 school girls in Guilan province (2005-2006), aimed to evaluate the current status of overweight/obesity among high-school girls in urban/rural. The results showed that a high percentage of the study students, especially the overweight/obese ones, skipped breakfast both in urban and rural areas. In addition, consuming energy dense, low-nutrient-density snack food was highly common during school hours, in both overweight/obese and normal weight girls, especially in rural areas; and school buffets provided most of the food consumed during the school day, especially in rural areas (47).

**18.** In a cross-sectional study on 569 students (12-16 years) in Yazd (2020), aimed to estimate and compare the macro- and micro-nutrients" intake in breakfast

and midmorning snacks, the results showed the prevalence of irregular breakfast eating was 61.9% among the students. The level of higher daily energy intake was reported in irregular breakfast eating adolescents. The midmorning snacks intake was reported among 85.6% of adolescents. The breakfast of 96.3% of the students was prepared from home. Significantly, energy from breakfast was higher in males ( $p < 0.05$ ). At breakfast, adjusted mean total carbohydrate, total fat, saturated fat, fat-soluble vitamins, vitamin B complex, vitamin C, and caffeine were significantly higher among the male students ( $p < 0.05$ ). Given the midmorning snacks, boys consumed significantly higher adjusted mean total carbohydrate, protein, saturated fat, vitamin C, zinc, calcium, and iron than girls (48).

**19.** In a National cross-sectional study overall, 14,880 students with a mean age of  $12.47 \pm 3.36$  years, were selected via multistage cluster sampling method from rural and urban areas of 30 provinces of Iran (2016-2017). The study aimed to assess the relationship between snack consumption and meal skipping in Iranian children and adolescents. The results showed that 14,880 students, 32.08, 8.89, and 10.90% skipped breakfast, lunch, and dinner, respectively. Compared to their counterpart groups, the frequency of meal skipping was higher in girls, urban inhabitants, and students in higher school grades ( $p < 0.05$ ) (49).

**20.** In a cross-sectional study with descriptive-analytic aspects on 300 high school students in Tehran, aimed to assess the relationship between eating breakfast and snack with awareness level in the students of one of the high schools in Tehran. The results showed that 72.6% of students take breakfast every day and only 2.1% went to school without it. 64.6% ate snack every day. There was no correlation between taking of breakfast with the level of attention in class and tuition, but the



math score was correlated with breakfast ( $p=0.045$ ,  $r=0.107$ ). There was a significant relationship between taking of breakfast with BMI ( $p<0.05$ ) (50).

**21.** In a cross-sectional study on 320 students from public high schools in Yazd city (2013), aimed to investigate the nutritional and health behaviors of high

school students. The results showed that 18% of students do not always eat breakfast and 48% of students consume carbonated soft drinks at least once a day, more than 64% of them consume prepared foods at least once in the last seven days (51).

**Table-1:** The general characteristics of included studies.

Author, Year, Reference	Study design	Study population	Study city/province	Gender	Main results
Lotfi et al., 2012, (31)	Descriptive study	223 elementary students	Zahedan	Male/female	51.6% of students reported that they were eating breakfast every day and 22% reported that they were consuming snack every day.
Alizadeh Siuki et al., 2014, (32)	Descriptive-analytical study	180 elementary students	Torbat-heydariyeh	Male/female	45.6% of students ate breakfast every day, and 10.4% of students went to school without breakfast and only 22.5% ate snack every day.
Rezakhani et al., 2007-2008, (33)	Descriptive-analytical study	1300 elementary students	Qazvin	Male/female	89.5% of students had eaten their breakfast before going to school.
Rohani et al., 2018, (34)	Descriptive-analytic cross-sectional study	312 elementary students	Esfarayen	Male/female	97.7% of the students consumed breakfast and reported an average breakfast of $6.11 \pm 1.3$ days a week.
Abedi et al., 2013-2014, (35)	Cross-sectional study	245 elementary students	Gonbad	Male/female	97.7% of the students consumed snack.
Sadr Hashemi et al., 2017, (36)	Cross-sectional study	360 elementary students	Isfahan	Male/female	10.5% of students were eating breakfast daily. The mean breakfast consumption (in a week) score of 2.4 with a standard deviation of 1.7.
Veghari et al., 2012, (37)	Descriptive study	7,426 elementary students	North of Iran	Male/female	91.7% of school children ate breakfast before going to school. Skipping breakfast were significant among 9.3% of students and in Turkman ethnic group were significantly less than other ethnic groups.
Mirzaei et al., 2016, (38)	Cross-sectional study	298 elementary students	Ilam	Male/female	32.2% of study schoolchildren skipped breakfast. There was a significant difference between boys and girls breakfast habit ( $p<0.05$ ).
Karimi et al., 2015, (39)	Cross-sectional study	155 elementary students	Omidieh	Female	79.5% of students reported that they regularly eat breakfast. In addition, 22% of students consume Junk foods, while 13% of them consumed traditional snacks including dried fruits and nuts.
Nazari Nasab et al., 2010-2011, (40)	Case-Control Study	100 elementary students	Tehran	Female	22% of participants in the case group reported that they typically have breakfast, while this figure was 80% in the control group.
Motlagh et al., 2015, (41)	Cross-sectional study	2,444 high students	Iran	Male/female	The mean type of food at home was 2.2 for breakfast and the mean amount of snacks at school was 1.8. 17.3% of the students at home breakfast and 16.2% of students at the school did not consume any food.

Hazavehei et al., 2008, (42)	Descriptive study	120 high students	Isfahan	Female	37.5% of students had poor nutritional knowledge, and 90% of the students had a poor nutritional practice.
Rahimi et al., 2009-2010, (43)	Descriptive-analytical study	100 high students	Qom	Female	25% of the studied students ate breakfast 7 days a week and 21% of students went to school without eating breakfast.
Karimi et al., 2013, (44)	Cross sectional descriptive analytical study	208 high students	Ramsar	Male/female	92.8% of samples ate breakfast at home and 96.2% had snack in school
Hosseini et al., 2011, (45)	Cross-sectional study	450 high school students	North Khorasan province	Male/female	Up to 60.2% and 64.5% of boys and 38.6% and 47.4% of girls in the morning and evening shift of the school eat breakfast during the weekdays, respectively.
Bahreynian et al., 2011-2012, (46)	Secondary study	13,486 students mean age of 12.50±3.36 years	30 provinces of Iran	Male/female	Among unhealthy snacks, sweets had the highest daily consumption, and fresh fruits were the most common used category of healthy snacks. Boys had more daily consumption of milk and girls had more daily consumption of fresh fruits.
Maddah et al., 2005-2006, (47)	Secondary study	2,302 high school students	Guilan province	Female	A high percentage of the study students, especially the overweight/obese ones, skipped breakfast both in urban and rural areas.
Karandish et al., 2020, (48)	Cross-sectional study	569 high school students	Yazd	Male/female	The prevalence of irregular breakfast eating was 61.9% among the students. The midmorning snacks intake was reported among 85.6% of adolescents.
Kelishadi et al., 2016-2017, (49)	Cross-sectional study	14,880 students with a mean age of 12.47±3.36 years	30 provinces of Iran	Male/female	32.08, 8.89, and 10.90% skipped breakfast, lunch, and dinner, respectively.
Jafari et al., 2013, (50)	Cross-sectional study	300 high school students	Tehran	Male/female	72.6% of students take breakfast every day and only 2.1% went to school without it. 64.6% ate snack every day.
Shahbazi et al., 2013, (51)	Cross-sectional study	320 high school students	Yazd	Male/female	18% of students do not always eat breakfast and 48% of students consume carbonated soft drinks at least once a day.

#### 4- DISCUSSION

Childhood and adolescence determine a person's eating habits and health in adulthood. This study aimed to investigate and review the pattern of breakfast and snack consumption and their effective factors among primary and high school students in Iran. This systematic review demonstrated that 32.2% and 32.08% of school-children and high-school students skipped breakfast, respectively. The midmorning snacks intake was reported among 97.7% of children and 96.2% of adolescents. Moreover, a significant

relationship was found between snack consumption and maternal age, maternal educational level, and birth order of the students. Also, there was an inverse relationship between students' age, economic situation and breakfast consumption ( $p=0.01$ ,  $r=-0.143$ ).

Students are a huge group of people in the society, so the student population in Iran is close to 13 million people, and their physical and mental health is necessary and necessary for a dynamic and healthy society (52-55). It should not be forgotten that childhood and adolescence are two

key periods in the formation of nutritional habits of people throughout life (56-58). On the other hand, nutrition, especially eating breakfast, can be mentioned as an important factor in the health and academic success of students, so that not eating breakfast is associated with a decrease in accuracy and mental concentration and academic failure (59-70). According to nutritionists, meals include three main meals: breakfast, lunch, dinner and two or three snacks. Therefore, eating breakfast is very important for everyone due to the increase in body metabolism in the morning and to compensate for the decrease in blood glucose in the brain after a night's sleep. Considering the point that the most intellectual activity is especially in the early hours of the day, breakfast should include food that can provide one third of the total daily energy requirement (27, 28, 71). However the results of present review indicated that 32.2% (9.3-32.2), and 32.08% (2.1-32.08) of school-children and high-school students skipped breakfast, respectively, and the frequency of meal skipping was higher in girls, urban inhabitants, and school children.

Various studies show that people who go to school without breakfast and hungry, this hunger leads to distraction, neglect of natural stimuli and active behaviors in children. Breakfast is considered to be the most important meal for reasons such as its calming feature at the beginning of the day and hunger relief of body cells, especially brain cells, blood sugar regulation and its direct effect on body weight (27, 28, 72). Children experiencing hunger are more likely to have lower physical functioning, more frequent stomachaches and headaches, mental health problems (e.g., depression, anxiety, behavioral problems), and to be in poorer health (73-78). The results of Zamani et al.'s study showed that students (6-18 years old) have unfavorable nutritional behaviors, so that 51% of the

children eat various types of puffs, industrial juices, carbonated drinks, candies, chocolates, and junk foods in general during They use it as a snack during the week (79). Studies show that students who skip breakfast generally have slower memory recall, make more errors and are more likely to be absent or tardy and to repeat a grade (80-82).

In the current review, the most important reasons for missing breakfast were low appetite, late waking up in the morning, non-flavored foods, and inattention of mothers. In addition, the higher educational level of parents, good socio-economic condition and unemployed fathers were amongst the most important risk factors for skipping breakfast by schoolchildren in this region.

Snacks play an important role in learning lesson content and concentration. In the hours around noon, even children who have eaten breakfast, get hungry and the concentration necessary for their learning is lost; But by eating the right snack, students' work capacity and learning ability will increase. Of course, the consumed snack must have sufficient nutritional value and guarantee the satisfaction of the person, be healthy in terms of health and fit with the family's economy. In choosing a suitable snack, in addition to the interest and appetite of the student, attention should be paid to the nutrients necessary for his growth and health, as well as the economic status of the family, and not in such a way as to cause the child's appetite to decrease and to miss the main meals (83). These healthy snacks can be fresh fruits, fresh vegetables, natural juices, nuts (walnuts, pistachios, almonds, hazelnuts, etc.), and biscuits (28, 85-87). The results of other studies show in urban and rural areas of the country, respectively, the consumption of snacks such as puffs and chips 20.3% and 25.8%, carbonated drinks 21.5% and 27.2%, chocolate and sweets 30.8% and 33.2%

were reported as snacks (88, 89). Based on the current review, fresh fruits (55.7%), biscuits, cakes, and cookies were the most frequently consumed snacks (49%). Among unhealthy snacks, sweets had the highest daily consumption (34.15%). Boys had higher consumption of sweetened beverages (22.57% vs. 17.6%), and fast foods (3.51% vs. 2.17%).

Students who eat breakfast generally have better vitamin and nutrient intake, enjoy overall healthier diets and are less prone to being overweight or obese. Eating breakfast regularly has been linked with greater intake of fiber, calcium, iron, vitamin C, and other vitamins and minerals, and lower intake of fat, cholesterol, and sodium (12-14). Children and adolescents who eat breakfast have more favorable weight-related outcomes (e.g., lower BMI, lower waist circumference, lesser likelihood of being chronically obese, decreased risk for obesity) in the short term and long term than those who skip breakfast (10, 13, 89-95). Although breakfast frequency and composition are very important among adolescents, other factors such as dinner quality, healthy back-to-school breakfast, physical activity, and SES are also effective (46).

Considering the important role of nutrition, especially breakfast and snacks, on students' health and academic efficiency, and since students spend a lot of time at school, school is an important platform for implementing policies and strategies to prevent and reduce the prevalence of eating habits. Childhood and adolescence are incorrect. Therefore, one should try to improve and improve the nutritional status of students through education and increasing nutritional awareness and using nutritional support strategies such as providing snacks in schools and supplementing with special nutrients such as iron and zinc. Paying more attention to proper nutrition and increasing the

nutritional awareness of students and families to choose foods with high nutritional value can be effective in their physical health and academic success (27, 28, 96).

## 5- CONCLUSION

Every people should start the school day with a healthy breakfast. Breakfast is often described as the most important meal of the day, providing as it does sustenance and energy (i.e., calories) for whatever activities lay ahead. Based on the results, the midmorning snacks intake was reported among 97.7% (13-97.7) of children and 96.2% (48.6-96.2) of adolescents. The most important reasons for missing breakfast were low appetite, late waking up in the morning, non-flavored foods, and inattention of mothers. There was an inverse relationship between students' age, economic situation and breakfast consumption. It is needed to conduct the schools health promotion programs for parents and students to encourage students to eat healthy breakfast and healthy snakes.

**6- CONFLICT OF INTEREST:** None.

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