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Impact of Skipping Breakfast on Adolescent Health: A Review

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Breakfast is considered to be the most important meal of the day, usually eaten within 2 hours of waking up and before starting daily activities. As it is the first meal after a physiological break with consciousness during the night, breakfast takes on great importance due to the time at which it is consumed and its nutritional components. Not eating breakfast has become a universal problem almost inherent to modern life, with prevalence can vary from 10% to 48% among adolescents, and is higher among girls. Adolescents are a group with many specific nutritional, emotional and social demands. Due to rapid body transformations, they need energy and nutrients for adequate growth, physical activity and academic performance, which makes them highly vulnerable nutritionally, since alterations or deficiencies occurring at this age can have repercussions on future life. This article is a mini-review covering the most recent studies on the subject and presents the main

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characteristics related to the role of breakfast and its importance in the daily diet, especially for adolescents, highlighting their nutritional needs, the repercussions that skipping breakfast can have on their health and quality of life and indicating possible measures that can be adopted to reverse this condition.

Keywords: Breakfast; adolescent; adolescent nutrition; nutritional habit.

1. INTRODUCTION

Adolescence, the period that comprises the second decade of life, is characterized by being a phase of physical, physiological, emotional and social transformations that integrate the transition from child to adult, resulting in a physically mature individual, with a defined personality, integrated into their social group and with full reproductive capacity (Best & Ban, 2021).

Adolescents represent around 16% of the world's population, totaling more than 1.3 billion in all continents, and constitute a group with many nutritional, emotional and social demands. Due to rapid body transformations, it is a period of great need for energy and nutrients to promote growth, associated with physical activity and academic performance, and adolescents are considered to be highly vulnerable. Changes or deficiencies occurring at this age can have repercussions on future life (Koenig et. al, 2025, Cheng & Mill, 2024, Park & Lee, 2022).

Adolescents have a peculiar circadian rhythm whose hormonal response to light/dark exposure leads to a delayed release of melatonin. As a result, they usually stay up later at night and stay asleep later in the morning (Crowley et. al, 2007, Agostini & Centofanti, 2021). These sleep/wake cycles influence eating habits and the frequency and composition of meals.

At this stage of life there are also changes in eating behavior (Heslin & MacNulty, 2023) which can be maintained into adulthood (Santos et al, 2023). Adolescents usually have a predilection for fast and processed foods, which leads them consume large amounts of saturated fats and sugar, and their diet is often low in vitamins and fiber (Best & Ban, 2021, Heslin & MacNulty, 2023).

To meet nutritional needs during adolescence, daily energy intake should be between 2200 Kcal and 2500 Kcal for females and between 2800 and 3400 Kcal for males. The daily distribution should be 50% to 55% carbohydrates, 30% fats and up to 20% proteins. Among the micronutrients, it should be noted that calcium intake should be 1300 mg/day (as up to 60% of bone mineralization occurs during adolescence) and iron intake should be between 11 mg (boys) and 15 mg (girls) (IOM, 2006).

2. SKIPPING BREAKFAST

Skipping breakfast (SB) has become a universal problem almost inherent to modern life. Its prevalence can vary from 10% to 48% (Sincovich et al, 2022, Sincovich et al, 2024, Simões et al, 2021, Haldar et al, 2024) among adolescents, and is higher among girls (Santos et al, 2012, Fiuza et al, 2017). The reasons given for SB are lack of time (Mohiuddin, 2018, Sincovich et al, 2022, Rani et al, 2021, Moller et al,2021, Gimenez-Legarre et al, 2022); weight control (Mohiuddin, 2018, Sincovich et al, 2022, Moller et al, 2021, Gimenez-Legarre et al, 2022); lack of hunger/appetite in the morning (Mohiuddin, 2018, Simões et al, 2021, Rani et al, 2021; Moller et al, 2021, Gimenez-Legarre et al, 2022); sleepiness or fatigue (Simões et al, 2021, Moller et al, 2021) and following restrictive diets (Mohiuddin, 2018, Trancoso et al, 2010, Simões et al, 2021).

Although its definition can vary according to cultural aspects, breakfast is considered to be the most important meal of the day, usually consumed in the morning, up to around 2 hours after waking up and before starting daily activities (Mohiuddin, 2018).

As it is the first meal after a physiological break with consciousness during the night, breakfast is of great importance due to the time it is consumed and its nutritional components (Martin et al, 2024, Keski-Rahkonen et al, 2003, Affinita et al, 2013), and should be present in daily life from childhood, when eating habits begin to be established. Although subject to variations resulting from cultural, social and economic aspects (Lazzeri et al, 2023), this meal is generally a good opportunity to consume milk and dairy products (as important sources of calcium), cereals and fruit (Santos et al, 2023,

Aznar et al, 2021), and should provide between 20% and 25% of the total energy required during the day (Mohiuddin, 2018, Tancoso et al, 2010).

Breakfast is recognized as an important indicator of health and quality of life because it provides the body with nutrients and energy for physical and cognitive functions (Sincovich et al, 2022, Sincovich et al, 2024), helping to establish proper eating habits and regulate energy intake at other meals during the day (Affinita et al, 2013, Trancoso et al, 2010).

Several studies have highlighted the health benefits of breakfast. These include its role in improving eating habits and reducing consumption of ultra-processed foods with high energy density and few nutrients (Lazzeri et al, 2023, Gurbuz et al, 2024, Parvathi et al, 2024). Eating a meal in the early hours of the day helps with proper cognitive performance and improves attention and memory (Trancoso et al, 2010), which are essential for academic activities. It also provides energy for physical activity, may play a role in protecting against excess weight (Wang et al, 2023) and consequently improves quality of life (Martin et al, 2024, Lundqvist et al, 2019). Despite its importance for health, there is currently a reduction in breakfast consumption in practically all countries (Cheng et al, 2024), especially among adolescents and young adults (Haldar et al, 2024).

3. REPERCUSSIONS ON ADOLESCENT HEALTH

SB is considered a good marker of adolescent health as it is associated with sedentary lifestyles and poor sleeping (Affinita et al, 2013) and other important behavioral risk factors in this age group such as alcohol consumption, smoking, sedentary lifestyles and substance use (Keski-Rahkonen et al, 2003, Gurbuz et al, 2024, Fiuza et al, 2017).

Adolescents who SB have worse eating behaviors (Mohiuddin, 2018, Keski-Rahkonen et al, 2003, Affinita et al, 2013) with a tendency to eat more food at subsequent meals, usually high in caloric density and fat (Affinita et al, 2013, Trancoso et al, 2010, Parvathi et al, 2024). Calcium deficiency is another important factor to consider among adolescents, as the main food sources of this micronutrient are generally consumed more at breakfast (Trancoso et al, 2010).

When breakfast is not eaten changes in metabolism and hormone secretion can also be observed due to long periods of fasting and reduced post-prandial energy expenditure. Long periods of fasting can alter glucose metabolism by increasing free fatty acid levels and disrupting circadian rhythms ((Parvathi et al, 2024). Alterations related to the cortisol rhythm in women can cause menstrual disorders (Mohiuddin, 2018).

SB is associated with a higher prevalence of overweight and obesity, especially in girls (Mohiuddin, 2018, Wang et al, 2023, Ardeshirlarijani et al, 2019) and cardiometabolic risks due to excess fat, high levels of cholesterol, low LDL and triglycerides and increased blood pressure (Santos et al, 2015, Mohiuddin, 2018, Souza et al, 2021), with consequent possibilities of cardiovascular diseases (Mohiuddin, 2018).

Among Japanese adolescents, especially those who are overweight, SB has been found to be associated with pre-diabetes which can also be verified in adulthood (Mohiuddin, 2018, Miyamura et al, 2023). Other consequences can also be found, such as esophageal diseases (Lei et al, 2025) and gastric diseases (Mohiuddin, 2018), due to the longer empty stomach, causing nausea and discomfort.

Another important aspect to be considered is the impairment of cognitive activities such as low school performance, damaging memory, attention and executive functions (Sincovich et al, 2022, Moller et al, 2021). With regard to emotional aspects, adolescents who SB are more likely to have behavioral changes, mood swings (Mohiuddin, 2018), depression, stress and anxiety (Sincovich et al, 2022, Gurbuz et al, 2024, Zahedi et al, 2022, Peprah et al, 2024).

Furthermore, as found among Canadian adolescents, they are 2.55 times more likely to report higher psychosomatic symptoms compared to non-breakfast skippers (Peprah et al, 2024).

4. CONCLUSION

Skipping breakfast is a universal problem that has been widely studied due to its repercussions on health in all age groups. Especially among

adolescents, who are the part of the population with the highest prevalence of skipping breakfast and are at a stage of life that requires energy and nutrients in specific quantities for their complete growth and development, this condition becomes a challenge that requires a lot of attention and needs to be modified.

As the establishment of eating habits begins in childhood, child and adolescent health care programs and childcare become the main mechanisms for proper dietary guidance to be implemented and adapted to the different age groups.

Other important actions can be developed in the school environment with the implementation of educational strategies and programs in nutrition aimed at children, adolescents and their families (Affinita et al, 2013, Lazzeri et al, 2018, Moller et al, 2021, Souza et al, 2021), investing in the importance of both the frequency and quality of breakfast. Nutrition education should be part of curricular activities at all stages of basic education, making it an investment with a high impact on health and quality of life.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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