

## Review Article

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# Skipping Breakfast Everyday Keeps Well-being Away

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**Received:** 28 November 2018; **Accepted:** 10 December 2018; **Published:** 20 December 2018

### Abstract

Breakfast, the first meal of the day, is considered the most important meal throughout the day. As nutritionist Adelle Davis famously put it back in the 1960s: “Eat breakfast like a king, lunch like a prince and dinner like a pauper”. Breakfast is most commonly skipped meal more than lunch and dinner specifically in the young adult in the university study period and those who wake up late. Lack of time is the main reason behind skipping meals, in general, lack of appetite, inability to cook, fasting/religion, and not being hungry. Many people are used to be in a hurry for job, business, children’s school in the morning where a filled stomach may prevent them to walk a long way. It is obvious that the irregular omission of breakfast may be effective in energy intake reduction over the next 24 hours and in this day, exercise performance may be compromised. There is no evidence that breakfast skipping reduces overeating or prevent weight gain. Some people argue that breakfast and good health is a marketing strategy by breakfast companies.

**Keywords:** Breakfast; Meal; Appetite; Omission; Energy; Metabolism; Time; Fasting; Skipping meal

**Abbreviation:** BMI-Body Mass Index; CVD-Cardiovascular Disease; CAD-Coronary Artery Disease; CHD-Coronary heart disease; EPIC-European Prospective Investigation into Cancer and Nutrition; FBG-Fasting Blood Glucose; GLP-Glucagon-Like Peptide; HP-Helicobacter pylori; IBS-Irritable Bowel Syndrome; IRB-Institutional Review Board; T2DM-Type 2 Diabetes Mellitus; WC-Waist Circumference

### 1. Introduction

The simple definition of breakfast is “the first meal of the day,” which is consistent with the etymology to “break” the “fast”. It is simply identified as “the first meal of the day,” consumed within 2 hours of waking, before starting daily activities. Experts say that people who eat breakfast are less likely to overeat the rest of the day. Breakfast-

eaters tend to have lower rates of heart disease, high blood pressure and high cholesterol, the American Heart Association reported in 2017. It might be better for weight loss to skip dinner, even eating an early dinner can boost calorie burn, according to Times Magazine. Moreover, it is found that Japanese people has decreased energy intake but the percentage of obese people has increased. This suggests that the timing of meals is related to obesity. However, skipping meals has become an increasingly popular part of modern life, especially in young adults. It was found that irregular omission of breakfast might be effective in energy intake reduction over the next 24 hours if the breakfast is habitually consumed and, in this day, exercise performance may be compromised. Cardiac function and sugar control mechanism disrupted along with weight gain, declined wits, mood swing, lethargy, bad breath, low cortisol, chronic inflammation, worsen periods in women commonly reported.

## **2. Skipping Breakfast: An Unhealthy Approach**

Unhealthy dietary behaviors play crucial role in increasing the upcoming risk of chronic diseases [1]. Breakfast is recommended to contain 20%-35% of daily energy needs [2]. It is considered the most important meal of the day as a part of a healthy balanced diet [3]. Breakfast habits are significantly associated with physiological, psychological, and social health dimensions [4]. Several studies reported associations between breakfast skipping and fatigue at noon, worsens memory and higher body mass index as well as increased prevalence of obesity-related chronic illness [5-7]; deficient in total energy, vitamins and minerals [8], increased risk of central adiposity [9], and risk of insulin resistance and cardio-metabolic disorders [10]. If the stomach is kept empty for a long time, the body will suffer a deficiency of proteins and glucose. Then blood sugar will drop down followed by mood swing [11]. In an Italian population-based study, there is a positive association between headache and meal skipping, especially due to the irregular intake of breakfast [12]. 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 [13]. Some studies have used solid foods only as breakfast and neglected other highly calorific beverages available, even with the fact that there are “differences in gastric emptying rate and metabolic response to different nutrients in solid versus liquid form” [14].

## **3. “Breakfast” Interpretation in Life Science**

A calorie is a balance of net energy does not differentiate between ingested nutrients or calories regarding chewing or not. By definition, it is the amount of heat required to raise the temperature of one gram of water from 14.5°C to 15.5°C. 1 calorie=4.184 joules. An amount of 209.2 kJ (50 kcal) is an appropriate starting spot to dismiss common behaviors that would not be recognized as a meal by most of the people. On the other hand, “time of day, time of waking, and/or the intervals that differentiate separate eating occasions” are also important considerations [15]. A duration of 2 hours after waking up was used in the definition of the breakfast meal and has been differentiated from snacks by a cut-off point of 1087.8 kJ (260 kcal) and independent consumption cases secluded on the basis of a 45 minutes period [16, 17]. Generally, it is sensible for an operational definition of breakfast to exemplify as “the first meal consumed within 2 hours after prolonged sleep in any 24 hours duration,” which represents the extended daily time consumed in the fasted-situation and the only time when most of the people are really post-absorptive [17, 18].

#### **4. A Common Issue of Breakfast Skipping with Young Adulthood**

Meal skipping rates may be highest during young adulthood, a period of transition and development [19]. Silliman et al. and Sakamaki et al. [20-21], reported a high prevalence of meal skipping among young adult population ranged from 24% to 87%. Several studies reported that recurrent missed breakfast among different age groups was more than lunch and dinner. Among the sample of Americans from different ages, the rate of breakfast skipping was nearly 11% comparing with lunch skipping around 10% and dinner skipping more than 5% [22, 23]. Another study among college students at the University of North Carolina, Charlotte reported that almost half (44.2%) of the students never take their breakfast comparing with lunch (3.5%) and dinner (2.3%) [24]. Australian young adults reported eating breakfast less than 5 days per week, compared with 10% of children and 33% of all adults (>18 years) [25].

##### **4.1 Reasons behind breakfast skipping**

Afolabi et al. [30] reported that 48%, 19%, and 13% of Nigeria university students skipping meals due to lack of time, appetite, and inability to cook, respectively [30]. Fasting/religion and money were mentioned by about 20% and 15% of Nigerian University students as a reason for skipping meals, respectively [31]. About half of Saudi Arabia University students skipping meals because they did not feel hunger while one-third of them don't have time and one-fifth skip meals because they want to control weight [32]. The study conducted by Shaw revealed that 52% of adolescent reported lack of time in the morning as the main reason for skipping breakfast [33]. Danquah et al. [34] reported that lack of time, not being hungry, and eating late at night were the reasons behind skipping breakfast in 57%, 22%, and 5% of Ghanaian university students [34]. In the study conducted by Lee et al. [35] on Korean University students, the second cause of skipping breakfast after the lack of time (noted by 61%) was the habit (17.6%). A similar study was found with four private university students of Bangladesh, more than 50% of the respondents skipped their breakfast due to a variety of reasons including class pressure and had fast food after finishing their classes [36].

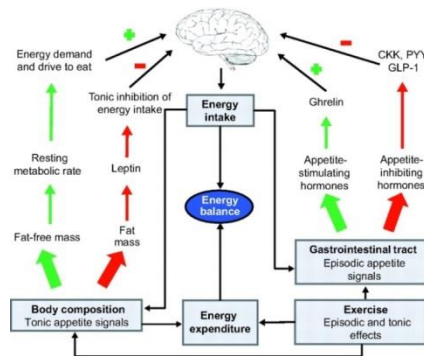
##### **4.2 Impact of skipping breakfast on subjective appetite**

High protein breakfast consists of 50% protein, 30% carbohydrate, and 20% fat reported to have more benefits on mood, alertness, and attention. This might be attributed to that high-protein breakfast resulted in more stable glucose and insulin than adequate protein breakfast [37]. It was also stated that protein keeps blood sugar levels while carbohydrate is important to offer energy to the body [38, 39]. Worldwide, there is a common thought that missing breakfast causing an increase in the desire for food, which stimulating overeating at following meals and inducing weight gain [10]. Subjective appetite variables such as “sensations of hunger, desire to eat, and prospective consumption” are estimated as higher in breakfast skipping comparing with breakfast eating conditions. Studies show that lunch intake was higher after breakfast skipping [40-43]. During 2015, two studies conducted by Clayton et al. [44-45] where the breakfast representing 25% energy supplies was taken at 08:00 clock, and lunch and dinner meals at 12:30 and 18:00-19:00 clock, respectively. A similar response was noted when standardized lunch (with 35% of energy requirements) and dinner (with 40% of energy supplies) meals were delivered so maintaining the

energy shortage produced by breakfast skipping. These findings revealed that the inaccurate regulation of subjective appetite is a result of an energy deficit. However, it should be noted that subjective appetite sensibilities do not constantly portend following energy assimilation [46-47].

**4.3 Effect of breakfast skipping on appetite-modulation peripheral hormones**

Part of the organization of appetite included numerous intestines peptides and among them the appetite motivator hormone ghrelin as well as hormones linked with satiation and satiety, like “peptide YY (PYY), (GLP-1), glucose-dependent insulinotropic polypeptide, cholecystokinin, and leptin.” Recognition of the reaction of such hormones to energy stability inconstancy could deliver worthy data about nutritional interferences (e.g. breakfast skipping) will be acceptable out of the laboratory atmosphere [48]. Astbury et al. [39] reported that the orexigenic hormones, GLP-1 and PYY were superior up to 30 minutes after consuming a 1,050 kJ liquefied meal two and half hours later to breakfast intake, comparing with later to breakfast skipping. Yet, no variations in the orexigenic hormone ghrelin were reported. Also, missing breakfast led to an increase in glucose and insulin as a result of the liquefied meal, compared with breakfast eating. This inhibition of glycemic reaction to the second meal of the day, recognized as the “second meal effect” which linked to glycogen storing [49]. In consistent, Gonzalez et al. [50] reported a trend in increasing glucose and insulin response to a 1500 kJ liquescent meal ate 3 hours later to skipping, comparing with eating breakfast, even that active GLP-1 levels didn’t not diverse between experiments.



**Figure 1:** Peripheral Mechanism of Appetite Regulation.

**4.4 Breakfast skipping and obesity**

Skipping breakfast had a greater influence on both waist circumference and BMI than eating dinner more than 3 hour before sleep [51]. An ethnic study shows correlation of overweight and obesity in school-going Fijian adolescent girls [52]. A strong and congruous relationship between breakfast skipping and obesity, but not overweight, reported among children in southeastern European population [53]. Breakfast Skipping is associated with the Risk of Obesity in School-aged Children [54]. Surprisingly, in lean people, skipping breakfast for 6 weeks increased the activity of genes that helped them to burn fat but this effect was not seen in obese adults [55]. A positive association between skipping breakfast, overweight and obesity is globally observed regardless of cultural diversity [56]. Eating of breakfast in all populations may be beneficial. Huang et.al [57] also supported with the

potential role of breakfast eating in obesity prevention. Obesity and heart disease claimed in a recent study showing that those who skipped breakfast increased their chance for hardening or narrowing their heart's arteries [58]. Gender may play a key part in breakfast skipping behaviors. In males, breakfast skipping was associated with increased odds of being overweight/obese [59].

#### **4.5 Breakfast skipping and cardiac complexities**

Habitual avoidance found to be associated with increased risk for development of CAD and hypertension in Western India [60]. Among adults, skipping meals may be linked to excess bodyweight, hypertension, insulin resistance, and elevated fasting lipid concentrations. Men who skipped breakfast had nearly 30% higher risk of CHD as compared with men who did not [61]. A relationship study between skipping breakfast and CVD risk factors such as blood pressure, serum lipids, smoking, and lack of exercise shows equivalent nature to lack of exercise, smoking, high blood pressure, and high serum total cholesterol [62]. More interestingly, a study in Brazil reflects Skipping breakfast is related to cardiovascular risk factors in adolescents, and this relationship was mainly mediated by trunk fatness [63]. However cardiovascular risk was found to associated with both skipping breakfast and late dinner [1]. Also, commendatory changes in cardiovascular risk factors have been reported by regular Korean traditional diet for 12 wk in hypertensive and diabetic patients [64].

#### **4.6 Diabetes and breakfast**

Skipping breakfast may increase the risk of T2DM independent of lifestyles and baseline levels of BMI and FBG in middle aged male and female, as reported by Uemura et.al [65]. An IRB approved study by Harvard School of Public Health (Boston, MA) reveals an increased risk of T2D in men even after adjustment for BMI [66]. A lower risk of type 2 diabetes mellitus (T2DM) and metabolic syndrome, prompting interest in the influence of breakfast on carbohydrate metabolism and indicators of T2DM risk [67]. The Health Professionals Follow-Up Study, The Nurses' Health Study, a Japanese study and the German EPIC cohort provide evidence that regular healthy breakfast consumption is associated with improved glycemic control [65], [68-70]. Skipping breakfast was closely associated with annual changes in BMI and WC among men, and eating breakfast more than four times per week may prevent the excessive body weight gain associated with skipping breakfast [71]. Also, development of metabolic inflexibility reported in response to prolonged fasting that may in the long-term lead to low-grade inflammation and impaired glucose homeostasis [72].

#### **4.7 Altered cognitive functions**

Skipping breakfast or eating a low-quality breakfast have a negative effect on cognitive function [73]. Glucose is the main fuel for brain function, and optimal cognitive function requires the maintenance of a stable blood glucose level [74]. Breakfast has a direct effect on blood glucose levels and, in turn, blood glucose levels have a direct effect on cognitive function [75-76]. In general, the brain performs best when the blood glucose level is in the range of 80-120 mg/dL [77]. With the gradual depletion of blood glucose and, consequently, energy consumption, people begin to feel hunger and fatigue and experience a decline in cognitive function [78]. A number of studies have reported that skipping breakfast lowers cognitive function and work efficiency [79-81].

#### **4.8 Mood swing and performance**

Psychological state and mood, all these variables can also be positively influenced by following healthy dietary practices and it is widely believed that one such practice is the regular consumption of breakfast [82]. Breakfast skipping has been considered an important determinant of an unhealthy lifestyle including alcohol use, smoking, and sedentary lifestyle, as well as low educational attainment, mood changes, and depressive symptoms [83]. Rate of depression has increased recently and association between the frequency of eating breakfast and depression in adults found in a recent study. Lack of breakfast consumption is also associated with depression among adults with different socioeconomic factors [84]. Children who habitually consume breakfast are more likely to have favorable nutrient intakes including higher intake of dietary fiber, total carbohydrate and lower total fat and cholesterol. Beneficial effects reported by Katie et.al, of breakfast for on-task behavior in the classroom, mainly in younger children <13 years [85]. On the other hand, skipping breakfast and taking meals irregularly were associated with the prevalence of fatigue in medical students [86].

#### **4.9 Low cortisol and women's health**

Women would rather do their hair than start the day with some breakfast, says a new survey. Female breakfast skippers display a disrupted cortisol rhythm and elevated blood pressure [87]. Habitual breakfast skippers would display a similar pattern of circulating cortisol and alterations in meal and stress-induced cortisol reactions. Based on a national survey, approximately 25% of American adults skip breakfast. Skipping breakfast adversely affects menstrual disorders as reported in 2 different studies in young college students of Japan and Palestine [88-90]. Women from developed countries are 2-4 times more likely to have IBS than men [91, 92]. A study in Japan shows fasting (1-2 L of fluid each day, along with some nutrition through their vein) improves pain, discomfort, abdominal distension, diarrhea, anorexia, nausea and anxiety in IBS [93]. But breakfast is strictly recommended along with regular meal pattern in patients with IBS-C because it stimulates colon and increase bowel movement [94-95]. However, Two out of five women admit missing breakfast leaves them hungry mid-morning, nearly 30% report feeling tired and low in energy and 15 per cent find it hard to concentrate. One in three skip meal in order to get ready for the day [96]. A thinning hair is reported in Reader's Digest [97]. Teens that skip breakfast are almost twice as likely to have bad breath; more than 35% suffered with bad breath reported in International Journal of Dental Hygiene [98].

#### **4.10 Abdominal discomfort, ulceration and cancer**

A Mexican study found association of skipping breakfast with gastric cancer [99] which is third most common cancer in men and the fifth in women. Frequent deviation in meal timing over a prolonged period appears associated with increased risk of developing HP infection and gastritis [100]. Skipping meals, leaving the stomach empty except for stomach acid, can create feelings of nausea [101]. Gallstones are more common in Europe, North America, and Australia, and are less prevalent in Egypt, Kashmir, Japan, China, India, and Africa. Breakfast skipping women are more prone to gallstone [102-103].

## 5. Conclusion

Not only breakfast, skipping a meal often creates harm to health, although fasting has its own advantage which is ritual in many religions. A healthy breakfast but not a heavy breakfast is highly recommended. Those who are in a rush can take a protein rich low volume diet. Protein shake as an alternative for breakfast is a common practice in many western countries but this discussion is not within the scope of this article. Skipping meal in IBS and gastroenteritis may found little benefit but no study ever pointed to skip a breakfast for those issues. A healthy breakfast is different for different people based on age, sex, living style and physical activities. School/University going students should never miss a breakfast causes they badly need a jumpstart of energy for the day. Diabetic people should keep in mind that the same is important for them to sensitize insulin release. Rich or poor, young or elderly, all must have a healthy refreshment in the morning for an energized and enthusiastic day start.

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**Citation:** Mohiuddin AK. Skipping Breakfast Everyday Keeps Well-being Away. Journal of Food Science and Nutrition Research 1 (2018): 018-030.



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