

Skipping Breakfast Everyday Keeps Well-Being Away

A.K. Mohiuddin*

Assistant Professor, Department of Pharmacy, World University of Bangladesh, Bangladesh

Abstract

Breakfast, the principal meal of the day, is viewed as the most vital dinner for the duration of the day. As nutritionist Adelle Davis broadly returned it during the 1960s: "Have breakfast like a lord, lunch like a ruler and supper like a homeless person". Breakfast is most normally skipped feast more than lunch and supper explicitly in the youthful grown-up in the college think about period and the individuals who wake up late. Absence of time is the principle explanation for skipping suppers, all in all, absence of hunger, failure to cook, fasting/religion, and not being eager. Many people are used to be in a hurry for job, business, and 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 h and in this day, exercise performance may be compromised. There is no evidence that breakfast skipping reduces overeating or prevents weight gain. Some people argue that breakfast and good health is a marketing strategy by breakfast companies.

Keywords: Breakfast, meal, appetite, omission, energy

***Author for Correspondence** E-mail: trymohi@gmail.com

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 h of waking, before starting daily activities. Experts say that people who eat breakfast are less likely to overeat the rest of the day. According to the American Heart Association in 2017, breakfast-eaters tend to have lower rates of heart disease, high blood pressure and high cholesterol. It might be better to skip dinner for weight loss; even eating an early dinner can boost calorie burn, according to Times Magazine. Moreover, it was 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 h 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 were commonly reported.

SKIPPING BREAKFAST: AN UNHEALTHY APPROACH

Unhealthy dietary behaviors play a 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 as 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 (BMI) 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 cardiometabolic 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 laid 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].

“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 1 gm 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 h after waking up was used in the definition of breakfast meal and has been differentiated from snacks by a cut-off point of 1,087.8 kJ (260 kcal) and independent consumption cases secluded on the basis of a 45 min period [16, 17]. Generally, it is sensible for an operational definition of breakfast to exemplify as “the first meal consumed within 2 h after prolonged sleep in any 24 h 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].

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.* reported a high prevalence of meal skipping among young adult population ranging from 24% to 87% [20, 21]. 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 for more than 5% [22, 23]. Another study among college students at the University of North Carolina, Charlotte revealed that nearly half (44.2%) of the understudies never take their morning meal contrasting lunch (3.5%) and supper (2.3%) [24]. Australian youthful grown-ups announced having breakfast under 5 days out of each week, contrasted and 10% of kids and 33% everything being equal (>18 years) [25].

REASONS BEHIND BREAKFAST SKIPPING

Afolabi *et al.* reported that 48%, 19%, and 13% of Nigeria university students were skipping meals due to lack of time, appetite, and inability to cook, respectively [26]. Fasting/religion and money were mentioned by about 20% and 15% of Nigerian University students as a reason for skipping meals, respectively [27]. About a portion of Saudi Arabia University understudies were skipping meals since they didn't feel hunger while 33% of them don't have time and one-fifth skip dinners since they need to control weight [28]. The examination directed by Shaw uncovered that 52% of juvenile announced absence of time in the first part of the day as the principle explanation behind skipping breakfast [29]. Danquah *et al.* 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, respectively [30]. In the study conducted by Lee and Yoon [31] 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 [32].

IMPACT OF SKIPPING BREAKFAST ON SUBJECTIVE APPETITE

High protein breakfast comprises of half protein, 30% sugar, and 20% fat answered to have more advantages on state of mind, sharpness, and consideration. This may be ascribed to that high-protein breakfast brought

about more steady glucose and insulin than sufficient protein breakfast [33]. It was also stated that protein keeps blood sugar levels while carbohydrate is important to offer energy to the body [34, 35]. Worldwide, there is a common thought that missing breakfast causes an increase in the desire for food, which stimulates overeating at following meals and induces weight gain [10]. Abstract craving factors, for example, "impressions of appetite, want to eat, and planned utilization" are evaluated as higher in breakfast skipping contrasting and breakfast eating conditions. Studies demonstrate that lunch admission was higher after breakfast skipping [36–39]. Amid 2015, two investigations directed by Clayton *et al.* [40, 41] where the morning meal speaking to 25% vitality supplies was taken at 8:00 am, and lunch and supper dinners at 12:30 pm and 18:00–19:00 pm, separately. A comparable reaction was noted when institutionalized lunch (with 35% of vitality necessities) and supper (with 40% of vitality supplies) dinners were conveyed so keeping up the vitality deficiency created by breakfast skipping. These findings revealed that 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 [42, 43].

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), glucagon-like peptide-1 (GLP-1), glucose-dependent insulinotropic polypeptide, cholecystokinin, and leptin. Acknowledgment of the response of such hormones to vitality dependability changeability could convey commendable information about healthful impedances (e.g., breakfast skipping) will be worthy out of the research facility climate [44]. Astbury *et al.* [35] reported that the orexigenic hormones, GLP-1 and PYY were superior up to 30 min 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 is recognized as the "second meal effect" which is linked to glycogen storing [45]. In consistent, Gonzalez *et al.* [46] reported a trend in increasing glucose and insulin response to a 1,500 kJ liquescent meal ate 3 h later to skipping, comparing with eating breakfast, even that active GLP-1 levels did not diverse between experiments (Figure 1).

BREAKFAST SKIPPING AND OBESITY

Skipping breakfast impacted both midsection outline and BMI than having supper over 3 h before rest [47]. An ethnic examination demonstrated relationship of overweight and heftiness in school-going Fijian juvenile young ladies [48]. A solid and congruous connection between breakfast skipping and heftiness; however, not overweight, detailed among kids in southeastern European populace [49]. Breakfast skipping is related with the risk of obesity in school-matured children [50]. Shockingly, in lean individuals, skipping breakfast for about a month and a half expanded the movement of qualities that helped them to consume fat; however, this impact was not seen in corpulent grown-ups [51]. A positive relationship between skipping breakfast, overweight and heftiness is internationally watched paying little respect to social decent variety [52]. Having breakfast in all populaces might be helpful. Huang *et al.* [53] likewise bolstered with the potential job of breakfast eating in heftiness counteractive action. Stoutness and coronary illness asserted in an ongoing report demonstrating that the individuals who skipped breakfast expanded their shot for solidifying or narrowing their heart's veins [54]. Sexual orientation may have a key influence in breakfast skipping practices. In guys, breakfast skipping was related with expanded chances of being overweight/fat [55].

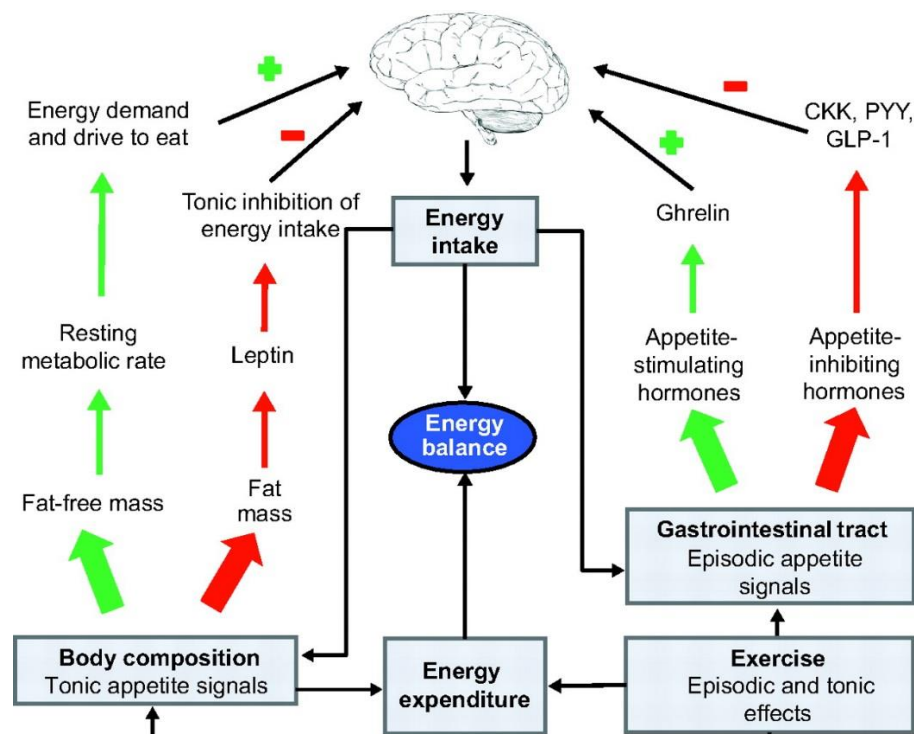


Fig. 1: Peripheral Mechanism of Appetite Regulation.

BREAKFAST SKIPPING AND CARDIAC COMPLEXITIES

Habitual avoidance was found to be associated with increased risk for development of coronary artery disease (CAD) and hypertension in Western India [56]. 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 coronary heart disease (CHD) as compared with men who did not [57]. A relationship study between skipping breakfast and cardiovascular disease (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 [58]. More interestingly, a study in Brazil reflected that skipping breakfast is related to CVD risk factors in adolescents, and this relationship was mainly mediated by trunk fatness [59]. However, cardiovascular risk was found to be 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 weeks in hypertensive and diabetic patients [60].

DIABETES AND BREAKFAST

Skipping breakfast may increase the risk of T2 diabetes mellitus (T2DM) independent of lifestyles and baseline levels of BMI and fasting blood glucose (FBG) in middle-aged male and female, as reported by Uemura *et al.* [61]. An IRB approved study by Harvard School of Public Health (Boston, MA) revealed an increased risk of T2D in men even after adjustment for BMI [62]. A lower danger of T2DM and metabolic disorder, inciting enthusiasm for the impact of breakfast on starch digestion and pointers of T2DM hazard [63]. The Health Professionals Follow-Up Study, The Nurses' Health Study, a Japanese report and the German EPIC companion give proof that standard solid breakfast utilization is related with enhanced glycemic control [61, 64–66]. Skipping breakfast was nearly connected with yearly changes in BMI and waist circumference (WC) among men, and having breakfast multiple times each week may keep the inordinate body weight gain related with skipping breakfast [67]. Likewise, advancement of metabolic firmness revealed in light of delayed fasting that may in the long haul lead to second rate aggravation and weakened glucose homeostasis [68].

ALTERED COGNITIVE FUNCTIONS

Skipping breakfast or eating a low-quality breakfast has a negative effect on cognitive function [69]. Glucose is the main fuel for brain function, and optimal cognitive function requires the maintenance of a stable blood glucose level [70]. Breakfast has a direct effect on blood glucose levels and, in turn, blood glucose levels have a direct effect on cognitive function [71, 72]. In general, the brain performs best when the blood glucose level is in the range of 80–120 mg/dl [73]. 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 [74]. A number of studies have reported that skipping breakfast lowers cognitive function and work efficiency [75–77].

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 [78]. Breakfast skipping has been considered as 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 [79]. Rate of melancholy has expanded as of late and relationship between the recurrence of having breakfast and sorrow in grown-ups was found in an ongoing report. Absence of breakfast utilization is additionally connected with gloom among grown-ups with various financial components [80]. Kids who routinely devour breakfast are bound to have great supplement admissions including higher admission of dietary fiber, add up to sugar and lower add up to fat and cholesterol. Gainful impacts was announced by Katie *et al.*, of breakfast for on-undertaking conduct in the classroom, for the most part in more youthful youngsters <13 years [81]. Then again, skipping breakfast and taking suppers unpredictably were related with the pervasiveness of weakness in restorative understudies [82].

LOW CORTISOL AND WOMEN'S HEALTH

Ladies would preferably do their hair over begin the day with some morning meal, says another review. Female breakfast captives show a disturbed cortisol musicality and hoisted circulatory strain [83]. Constant breakfast captives would show a comparative example of circling cortisol and adjustments in supper and stress-instigated cortisol responses. In view of a national overview, roughly 25% of American grown-ups skip breakfast. Skipping breakfast unfavorably influences menstrual disarrangement as detailed in two unique examinations in youthful understudies of Japan and Palestine [84–86]. Ladies from created nations are 2–4 times bound to have irritable bowel syndrome (IBS) than men [87, 88]. 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 [89]. But breakfast is strictly recommended along with regular meal pattern in patients with IBS-C because it stimulates colon and increases the bowel movement [90, 91]. However, 40% women admit missing breakfast leaves them hungry mid-morning; nearly 30% report feeling tired and low in energy and 15% find it hard to concentrate. One in three women skips their meal in order to get ready for the day [92]. A thinning hair is reported in Reader's Digest [93]. 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 [94].

ABDOMINAL DISCOMFORT, ULCERATION AND CANCER

A Mexican study found association of skipping breakfast with gastric cancer [95] which is the 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 *Helicobacter pylori* (HP) infection and gastritis [96]. Skipping meals, leaving the stomach empty except for stomach acid, can create feelings of nausea [97-101].

CONCLUSION

Not only breakfast, skipping any 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, lifestyle 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 healthy refreshment in the morning for an energized and enthusiastic day start.

REFERENCES

- Zilberter T, Zilberter EY. Breakfast: to skip or not to skip. *Front Public Health*. 2014; 2: 59p. doi:10.3389/fpubh.2014.00059
- Timlin MT, Pereira MA. Breakfast frequency and quality in the etiology of adult obesity and chronic diseases. *Nutr Rev*. 2007; 65: 268–81p.
- Marangoni F, Poli A, Agostoni C, *et al*. A consensus document on the role of breakfast in the attainment and maintenance of health and wellness. *Acta Biomed*. 2009; 80: 166–71p.
- Chen J, Cheng J, Liu Y, *et al*. Association between breakfast eating habits and health-promoting lifestyle, suboptimal health status in Southern China: a population based, cross sectional study. *J Transl Med*. 2014; 12: 348p. doi:10.1186/s12967-014-0348-1.
- Cho S, Dietrich M, Brown CJP, *et al*. The effect of breakfast type on total daily energy intake and body mass index: results from the Third National Health and Nutrition Examination Survey (NHANES III). *J Am Coll Nutr*. 2003; 22: 296–302p.
- Purslow LR, Sandhu MS, Forouhi N, *et al*. Energy intake at breakfast and weight change: prospective study of 6,764 middle-aged men and women. *Am J Epidemiol*. 2008; 167: 188–92p.
- Mekary RA, Giovannucci E, Willett WC, *et al*. Eating patterns and type 2 diabetes risk in men: breakfast omission, eating frequency, and snacking. *Am J Clin Nutr*. 2012; 95: 1182–9p.
- Deshmukh-Taskar PR, Nicklas TA, O’Neil CE, *et al*. The relationship of breakfast skipping and type of breakfast consumption with nutrient intake and weight status in children and adolescents: the National Health and Nutrition Examination Survey 1999–2006. *J Am Diet Assoc*. 2010; 110(6): 869–78p.
- Smith KJ, Gall SL, McNaughton SA, *et al*. Skipping breakfast: longitudinal associations with cardiometabolic risk factors in the Childhood Determinants of Adult Health Study. *Am J Clin Nutr*. 2010; 92(6): 1316–25p.
- Pereira MA, Erickson E, McKee P, *et al*. Breakfast frequency and quality may affect glycemia and appetite in adults and children. *J Nutr*. 2011; 141: 163–8p.
- Haupt A. Food and Mood: 6 Ways Your Diet Affects How You Feel. *Health* [Internet]; 2011. Available from: <http://health.usnews.com/health-news/diet-fitness/diet/articles/2011/08/31/food-and-mood-6-waysyour-diet-affects-how-you-feel>
- Moschiano F, Messina P, D’Amico D, *et al*. Headache, eating and sleeping behaviors and lifestyle factors in preadolescents and adolescents: preliminary results from an Italian population study. *Neurol Sci*. 2012; 33: 87–90p. doi:10.1007/s10072-012-1048-3.
- O’Neil CE, Byrd-Bredbenner C, Hayes D, *et al*. The role of breakfast in health: definition and criteria for a quality breakfast. *J Acad Nutr Diet*. 2014; 114(12): S8–S26.
- Berry MK, Russo A, Wishart JM, *et al*. Effect of solid meal on gastric emptying of, and glycemic and cardiovascular responses to, liquid glucose in older subjects. *Am J Physiol*. 2002; 284: G655–62.
- Betts JA, Chowdhury EA, Javier T, *et al*. Conference on ‘Roles of sleep and circadian rhythms in the origin and nutritional management of obesity and

- metabolic disease' Cuthbertson Medal Lecture. Is breakfast the most important meal of the day? *Proc Nutr Soc.* 2016; 75: 464–74p.
16. de Castro JM. Accommodation of particular foods or beverages into spontaneously ingested evening meals. *Appetite.* 1994; 23: 57–66p.
 17. Betts JA, Thompson D, Richardson JD, *et al.* Bath Breakfast Project (BBP)—examining the role of extended daily fasting in human energy balance and associated health outcomes: study protocol for a randomised controlled trial [ISRCTN31521726]. *Trials.* 2011; 12: 172–84p.
 18. Ruge T, Hodson L, Cheeseman J, *et al.* Fasted to fed trafficking of Fatty acids in human adipose tissue reveals a novel regulatory step for enhanced fat storage. *J Clin Endocrinol Metab.* 2009; 94: 1781–8p.
 19. Dubois L, Girard M, Kent MP, *et al.* Breakfast skipping is associated with differences in meal patterns, macronutrient intakes and overweight among pre-school children. *Public Health Nutr.* 2009; 12(01): 19–28p.
 20. Silliman K, Rodas-Fortier K, Neyman M. A survey of dietary and exercise habits and perceived barriers to following a healthy lifestyle in a college population. *Cal J Health Promot.* 2004; 18: 281p.
 21. Sakamaki R, Toyama K, Amamoto R, *et al.* Nutritional knowledge, food habits and health attitude of Chinese university students—a cross sectional study. *Nutr J.* 2005; 4(1): 1p.
 22. Gross SM, Bronner Y, Welch C, *et al.* Breakfast and lunch meal skipping patterns among fourth grade children from selected public schools in urban, suburban, and rural Maryland. *J Am Diet Assoc.* 2004; 104(3): 420–3p.
 23. Savige G, MacFarlane A, Ball K, *et al.* Snacking behaviours of adolescents and their association with skipping meals. *Int J Behav Nutr Phys Act.* 2007; 4(1): 36p.
 24. De Bate RD, Topping M, Sargent RG. Racial and gender differences in weight status and dietary practices among college students. *Adolescence.* 2001; 36(144): 819p.
 25. Australian Bureau of Statistics. *Australian Health Survey: Nutrition First Results—Foods and Nutrients, 2011–12.* Canberra, Australia: Australian Government; 2014.
 26. Afolabi W, Towobola SK, Oguntona CR, *et al.* Pattern of fast food consumption and contribution to nutrient intakes of Nigerian University students. *Int J Educ Res.* 2013; 1(5): 1–10p.
 27. Ukegbu PO, Uwaegbute AC, Usonka VA. Contribution of snacks to energy and nutrient intake of undergraduates in a Nigerian university. *Malaysian J Nutr.* 2015; 21(1): 15–23p.
 28. Eldisoky ST. Interactive relation between dietary habits and spread of malnutrition diseases. *Ann Agric Sci (Cairo).* 2003; 48(2): 663–75p.
 29. Shaw ME. Adolescent breakfast skipping: an Australian study. *Adolescence.* 1998; 33(132): 851–61p.
 30. Danquah AO, Odjogi Y, Graham-Acquaah S, *et al.* A pilot study of the dietary and physical activity behaviours of international students: implications for health promotion. *Afr J Food Sci.* 2010; 4(3): 86–92p.
 31. Yao CZ, Shun ML, Guo LX, *et al.* Influences of protein to energy ratios in breakfast on mood, alertness and attention in the healthy undergraduate students. *Health.* 2011; 3: 383–93p. doi:10.4236/health.2011.36065.
 32. Gannon MC, Nuttall FQ. Control of blood glucose in type 2 diabetes without weight loss by modification of diet composition. *Nutr Metab (Lond).* 2006; 3: 16p.
 33. Munmun SB, Shatabdi G. Fast food preferences and food habits among students of private universities in Bangladesh. *South East Asia Journal of Public Health.* 2013; 3(1): 61–4p.
 34. Austin GL, Ogden LG, Hill JO. Trends in carbohydrate, fat, and protein intakes and association with energy intake in normal-weight, overweight, and obese individuals: 1971–2006. *Am J Clin Nutr.* 2011; 93(4): 836–43p. doi:10.3945/ajcn.110.000141 [Epub 2011 Feb 10].
 35. Astbury NM, Taylor MA, Macdonald IA. Breakfast consumption affects appetite, energy intake, and the metabolic and endocrine responses to foods consumed later in the day in male habitual breakfast eaters. *J Nutr.* 2011; 141(7): 1381–9p.
 36. Leidy HJ, Ortinau LC, Douglas SM, *et al.* Beneficial effects of a higher-protein

- breakfast on the appetitive, hormonal, and neural signals controlling energy intake regulation in overweight/ obese, “breakfast-skipping,” late-adolescent girls. *Am J Clin Nutr*. 2013; 97(4): 677–88p. doi:10.3945/ajcn.112.053116.
37. Levitsky DA, Pacanowski CR. Effect of skipping breakfast on subsequent energy intake. *Physiol Behav*. 2013; 119: 9–16p. doi: 10.1016/j.physbeh.2013.05.006.
38. McCrory MA. Meal skipping and variables related to energy balance in adults: a brief review, with emphasis on the breakfast meal. *Physiol Behav*. 2014; 134: 51–4p.
39. Flint A, Raben A, Blundell JE, *et al*. Reproducibility, power and validity of visual analogue scales in assessment of appetite sensations in single test meal studies. *Int J Obes*. 2000; 24: 38–48p.
40. Clayton DJ, Barutcu A, Machin C, *et al*. Effect of breakfast omission on energy intake and evening exercise performance. *Med Sci Sports Exerc*. 2015a; 47: 2645–52p.
41. Clayton DJ, Stensel DJ, James LJ. Effect of breakfast omission on subjective appetite, metabolism, acylated ghrelin and GLP-17–36 during rest and exercise. *Nutrition*. 2016; 32(2): 179–85p.
42. Clayton DJ, Stensel DJ, Watson P, *et al*. The effect of post-exercise drink macronutrient content on appetite and energy intake. *Appetite*. 2014; 82: 173–9p.
43. James LJ, Funnell MP, Milner S. An afternoon snack of berries reduces subsequent energy intake compared to an isoenergetic confectionary snack. *Appetite*. 2015; 95: 132–7p.
44. Clayton DJ, James LJ. The effect of breakfast on appetite regulation, energy balance and exercise performance. *Proc Nutr Soc*. 2016; 75(3): 319–27p. doi:10.1017/S0029665115004243.
45. Jovanovic A, Leverton E, Solanky B, *et al*. The second meal phenomenon is associated with enhanced muscle glycogen storage in humans. *Clin Sci*. 2009; 117: 119–27p.
46. Gonzalez JT, Veasey RC, Rumbold PLS, *et al*. Breakfast and exercise contingently affect postprandial metabolism and energy balance in physically active males. *Br J Nutr*. 2013; 110: 721–32p.
47. Yoko W, Isao S, Ikuyo H, *et al*. Skipping Breakfast is Correlated with Obesity. *J Rural Med*. 2014; 9(2): 51–8p. doi: [10.2185/jrm.2887] PMID: 25648986.
48. Thompson-McCormick JJ, Thomas JJ, Bainivualiku A, *et al*. Breakfast skipping as a risk correlate of overweight and obesity in school-going ethnic Fijian adolescent girls. *Asia Pac J Clin Nutr Asia Pac J Clin Nutr*. 2010; 19(3): 372–82p. PMID: 20805082.
49. Burazeri G, HyskaJ, Mone I, *et al*. Breakfast Skipping Is an Independent Predictor of Obesity but not Overweight Among Children in a Southeastern European Population. *Int J Vitam Nutr Res*. 2016; 86(3–4): 242–8p. PMID:28806888DOI:10.1024/0300-9831/a000272.
50. Isgin K, Bellikci-Koyu E, Akyol-Mutlu A, *et al*. Breakfast Skipping Linked to the Risk of Obesity in School-Aged Children. *Journal of the Academy of Nutrition and Dietetics*. 2017; 117(9): A19. DOI: <https://doi.org/10.1016/j.jand.2017.06.352>.
51. Ana S. The effects of skipping breakfast depend on your weight. *Medical News Today* [Internet]; 2017 November 29.
52. Chika H, Satoru K, Yachi Y, *et al*. Skipping breakfast and prevalence of overweight and obesity in Asian and Pacific regions: A meta-analysis. *Preventive Medicine*. 2011; 53(4–5): 260–7p. Available from: <https://doi.org/10.1016/j.ypmed.2011.08.030>.
53. Huang C, Hu H, Fan Y, *et al*. Associations of breakfast skipping with obesity and health-related quality of life: evidence from a national survey in Taiwan. *International Journal of Obesity*. 2010; 34: 720–5p.
54. Danielle Z. Skipping breakfast to lose weight can INCREASE the risk of obesity and heart disease, a study claim. *Dailymail* [Internet]; 2017 Oct 2. Available from: Dailymail.co.uk
55. Nora B, Fiona R, Nathalie M, *et al*. Breakfast Skipping and overweight/obesity among European adolescents, a cross-sectional analysis of the HELENA dataset: a DEDIPAC study [version 1; referees: 1 approved with reservations]. *HRB Open Res*. 2018, 1: 19p. Available from: <https://doi.org/10.12688/hrbopenres.12847.1>
56. Sharma K, Shah K, Brahmabhatt P, *et al*. Skipping breakfast and the risk of coronary

- artery disease. *QJM*. 2018; 111(10): 715–19p. doi: 10.1093/qjmed/hcy162. PMID: 30016512.
57. Leah EC, Stephanie EC, Rania AM, *et al.* A Prospective Study of Breakfast Eating and Incident Coronary Heart Disease in a Cohort of Male U.S. Health Professionals. *Circulation*. 2013; 128(4): 337–43p. doi: [10.1161/CIRCULATIONAHA.113.001474] PMID: 23877060.
58. Sakata K, Matumura Y, Yoshimura N, *et al.* Relationship between skipping breakfast and cardiovascular disease risk factors in the national nutrition survey data. *Nihon Koshu Eisei Zasshi*. 2001; 48(10): 837–41p. PMID:11725527.
59. Cayres SU, Júnior IF, Barbosa MF, *et al.* Breakfast frequency, adiposity, and cardiovascular risk factors as markers in adolescents. *Cardiol Young*. 2016; 26(2): 244–9p. doi: 10.1017/S1047951115000050. Epub 2015 Feb 10. PMID: 25668394.
60. Jung SJ, Park SH, Choi EK, *et al.* Beneficial effects of Korean traditional diets in hypertensive and type 2 diabetic patients. *J Med Food*. 2014; 17(1): 161–71p. PMID: 24456367. DOI: 10.1089/jmf.2013.3042.
61. Uemura M, Yatsuya H, Hilawe EH, *et al.* Breakfast Skipping is Positively Associated with Incidence of Type 2 Diabetes Mellitus: Evidence from the Aichi Workers' Cohort Study. *J Epidemiol*. 2015; 25(5): 351–8p. doi: [10.2188/jea.JE20140109]; PMID: 25787236.
62. Rania AM, Giovannucci E, Willette WC, *et al.* Eating patterns and type 2 diabetes risk in men: breakfast omission, eating frequency, and snacking. *Am J Clin Nutr*. 2012; 95(5): 1182–9p. doi: [10.3945/ajcn.111.028209]; PMID: 22456660.
63. Maki KC, Phillips-Eakley AK, Smith KN. The Effects of Breakfast Consumption and Composition on Metabolic Wellness with a Focus on Carbohydrate Metabolism. *Adv Nutr*. 2016; 7(3): 613S–621S. doi: [10.3945/an.115.010314]; PMID: 27184288.
64. Iqbal K, Schwingshackl L, Gottschald M, *et al.* Breakfast quality and cardiometabolic risk profiles in an upper middle-aged German population. *Eur J Clin Nutr*. 2017; 71: 1312–20p. doi: 10.1038/ejcn.2017.116
65. Mekary RA, Giovannucci E, Cahill L, *et al.* Eating patterns and type 2 diabetes risk in older women: Breakfast consumption and eating frequency. *Am J Clin Nutr*. 2013; 98: 436–43p. doi: 10.3945/ajcn.112.057521.
66. Mekary RA, Giovannucci E, Willett WC, *et al.* Eating patterns and type 2 diabetes risk in men: Breakfast omission, eating frequency, and snacking. *Am J Clin Nutr*. 2012; 95: 1182–9p. doi: 10.3945/ajcn.111.028209.
67. Sakurai M, Yoshita M. Skipping breakfast and 5-year changes in body mass index and waist circumference in Japanese men and women. *Obes Sci Pract*. 2017; 3(2): 162–70p. doi: [10.1002/osp4.106]; PMID: 28702211.
68. Nas A, Mirza N, Hagele F, *et al.* Impact of breakfast skipping compared with dinner skipping on regulation of energy balance and metabolic risk. *Am J Clin Nutr*. 2017; 105(6): 1351–61p. doi: 10.3945/ajcn.116.151332; PMID: 28490511.
69. Hoyland A, Dye L, Lawton CL. A systematic review of the effect of breakfast on the cognitive performance of children and adolescents. *Nutr Res Rev*. 2009; 22(2): 220–43p. doi: 10.1017/S0954422409990175.
70. Sunram-Lea SI, Foster JK, Durlach P, Perez C. The effect of retrograde and anterograde glucose administration on memory performance in healthy young adults. *Behav Brain Res*. 2002; 134(1–2): 505–16p. doi: 10.1016/S0166-4328(02)00086-4.
71. Scholey AB, Harper S, Kennedy DO. Cognitive demand and blood glucose. *Physiol Behav*. 2001; 73(4): 585–92p. doi: 10.1016/S0031-9384(01)00476-0.
72. Messier C. Glucose improvement of memory: a review. *Eur J Pharmacol*. 2004; 490(1–3): 33–57p. doi: 10.1016/j.ejphar.2004.02.043.
73. Morohoshi E, Adachi S. Effect of the different types of interventions on meal aimed to control the postprandial blood glucose levels: profiles of young healthy women monitored by the self-measuring method. *J Jpn Health Med Assoc*. 2015; 23: 279–88p.

74. Kennedy DO, Scholey AB. Glucose administration, heart rate and cognitive performance: effects of increasing mental effort. *Psychopharmacology (Berl)*. 2000; 149(1): 63–71p. doi: 10.1007/s002139900335.
75. Veasey RC, Gonzalez JT, Kennedy DO, et al. Breakfast consumption and exercise interact to affect appetite, cognitive performance and mood later in the day. *Appetite*. 2012; 59(2): 636–41p. doi: 10.1016/j.appet.2012.05.103.
76. Wesnes KA, Pincock C, Richardson D, et al. Breakfast reduces declines in attention and memory over the morning in schoolchildren. *Appetite*. 2003; 41(3): 329–31p. doi: 10.1016/j.appet.2003.08.009.
77. Hoyland A, Lawton C, Dye L. Influence of breakfast on cognitive performance, appetite and mood in healthy young adults. *Appetite*. 2008; 50(2): 560–6p. doi: 10.1016/j.appet.2007.09.036.
78. Rachel CV, Haskell-Ramsay CF, Kennedy DO, et al. The Effect of Breakfast Prior to Morning Exercise on Cognitive Performance, Mood and Appetite Later in the Day in Habitually Active Women. *Nutrients*. 2015; 7(7): 5712–32p. doi: [10.3390/nu7075250]; PMID: 26184302.
79. Keski-Rahkonen A, Kaprio J, Rissanen A, et al. Breakfast skipping and health-compromising behaviors in adolescents and adults. *Eur J Clin Nutr*. 2003; 57: 842p. doi: 10.1038/sj.ejcn.1601618.
80. Lee SA, Park EC, Ju YJ, et al. Breakfast consumption and depressive mood: A focus on socioeconomic status. *Appetite*. 2017; 114: 313–19p. doi: 10.1016/j.appet.2017.04.007. Epub 2017 Apr 8. PMID: 28400301.
81. Katie A, Lawton CL, Louise D. The effects of breakfast on behavior and academic performance in children and adolescents. *Front Hum Neurosci*. 2013; 7: 425p. doi: [10.3389/fnhum.2013.00425] PMID: 23964220.
82. Tanaka M, Mizuno K, Fukuda S, et al. Relationships between dietary habits and the prevalence of fatigue in medical students. *Nutrition*. 2008; 24(10): 985–9p. doi: 10.1016/j.nut.2008.05.003. Epub 2008 Jun 17. PMID: 18562170.
83. Witbracht M, Keim NL, Forester S, et al. Female breakfast skippers display a disrupted cortisol rhythm and elevated blood pressure. *Physiol Behav*. 2015; 140: 215–21p. doi: 10.1016/j.physbeh.2014.12.044. Epub 2014 Dec 27. PMID: 25545767.
84. Helwa HAA, Mitaeb AA. Prevalence of dysmenorrhea and predictors of its pain intensity among Palestinian female university students. *BMC Womens Health*. 2018; 18: 18p. doi: [10.1186/s12905-018-0516-1]; PMID: 29334974.
85. Fujiwara T. Skipping breakfast is associated with dysmenorrhea in young women in Japan. *Int J Food Sci Nutr*. 2003; 54(6): 505–9p. PMID: 14522696; DOI: 10.1080/09637480310001622369.
86. Fujiwara T, Sato N, Awaji H, et al. Skipping breakfast adversely affects menstrual disorders in young college students. *Int J Food Sci Nutr*. 2009; 60(Suppl 6): 23–31p. PMID: 19468949; DOI: 10.1080/09637480802260998.
87. Choung RS, Locke GR. Epidemiology of IBS. *Gastroenterol Clin North Am*. 2011; 40: 1–10p.
88. Chang L, Heitkemper MM. Gender differences in irritable bowel syndrome. *Gastroenterology*. 2002; 123: 1686–701p.
89. Kanazawa M, Fukudo S. Effects of fasting therapy on irritable bowel syndrome. *Int J Behav Med*. 2006; 13(3): 214–20p. PMID: 17078771; DOI: 10.1207/s15327558ijbm1303_4.
90. McKenzie YA, Bowyer RK, Leach H, et al. British Dietetic Association systematic review and evidence-based practice guidelines for the dietary management of irritable bowel syndrome in adults (2016 update). *J Hum Nutr Diet*. 2016; 29: 549–75p.
91. National Institute for Health and Clinical Excellence. *Irritable bowel syndrome in adults: diagnosis and management. Clinical Guideline [CG61]*. UK: NICE; 2008 Feb. Last updated: February 2015. Available from: <https://www.nice.org.uk/guidance/cg61/resources/irritable-bowel-syndrome-in-adults-diagnosis-and-management-975562917829> [cited on 2017 Jan 3].
92. Jenny H. Women would rather do their hair than eat breakfast: One in three skip meal in order to get ready for the day. *Dailymail*

- [Internet]; 2014 Jan 25. Available from: dailymail.co.uk
93. Weinhouse B. Beauty 18 Bad Habits That Are Thinning Your Hair. *Reader's Digest* [Internet]; 2017. Available from: <https://www.rd.com/health/beauty/bad-habits-that-cause-thinning-hair/>
94. Rani H, Ueno M, Zaitso T, *et al.* Oral malodour among adolescents and its association with health behaviour and oral health status. *International Journal of Dental Hygiene*. 2015; 14(2): 10.1111/idh.12160.
95. Verdalet-Olmedo M, Sampieri CL, Morales-Romero J, *et al.* Omission of breakfast and risk of gastric cancer in Mexico. *World J Gastrointest Oncol*. 2012; 4(11): 223–9p. doi: [10.4251/wjgo.v4.i11.223]; PMID: 23444276.
96. Su-Lin L, Canavarró C, Zaw MH. Irregular Meal Timing Is Associated with *Helicobacter pylori* Infection and Gastritis. *ISRN Nutr*. 2013; 2013: 714970. doi: [10.5402/2013/714970]; PMID: 24967249.
97. Cindy H. Skipping Meals & Stomach Cramps. *Livestrong* [Internet]; 2017 Aug 14. Available from: www.livestrong.com.
98. Pendergast FJ, Livingstone KM, Worsley A, *et al.* Correlates of meal skipping in young adults: a systematic review. *Int J Behav Nutr Phys Act*. 2016; 13: 125p.
99. Mulye TP, Park MJ, Nelson CD, *et al.* Trends in adolescent and young adult health in the United States. *J Adolesc Health*. 2009; 45(1): 8–24p.
100. Betts NM, Amos RJ, Keim K, *et al.* Ways young adults view foods. *J Nutr Educ*. 1997; 29(2): 73–9p.
101. Jabs J, Devine CM. Time scarcity and food choices: an overview. *Appetite*. 2006; 47(2): 196–204p.

Cite this Article

Mohiuddin AK. Skipping Breakfast Everyday Keeps Well-Being Away. *Research and Reviews: Journal of Dairy Science and Technology*. 2018; 7(3): 20–30p.