

# **BREAKFAST EATER VS BREAKFAST SKIPPER (WHO IS BETTER ON COGNITIVE FUNCTION): A CORRELATIONAL STUDY AMONG COLLEGE STUDENTS**

**Siti Maryam**

Universitas Syiah Kuala, Banda Aceh, Indonesia

Email: [siti.maryam@unsyiah.ac.id](mailto:siti.maryam@unsyiah.ac.id)

**Fadli A. Gani**

Universitas Syiah Kuala, Banda Aceh, Indonesia

Email: [fadli.agani@unsyiah.ac.id](mailto:fadli.agani@unsyiah.ac.id)

**Fatmawati**

Universitas Syiah Kuala, Banda Aceh, Indonesia

Email: [fatmawati@ar-raniry.ac.id](mailto:fatmawati@ar-raniry.ac.id)

## **Abstrak**

Breakfast is one of the most important meals within a day and many studies have found that regular breakfast consumption is important in order to maintain an academic performance above average. However, young adults aged 17-24 years old are the highest population of breakfast skippers among other groups. Therefore, this study aimed to measure the association between frequency of breakfast consumption and cognitive function among college students in Banda Aceh city. The number of participant recruited through simple random technique was 300 college students. Cognitive Functioning Self-Assessment Scale was employed in order to obtain the data on cognitive function, whereas breakfast consumption was calculated based on the frequency of taking breakfast during the past week. Pearson Correlation was used to analyze the data and it showed a positive relationship between those two variables. Besides, the analysis also displayed a significance value of 0.000 ( $p < 0.05$ ). This indicated that the hypothesis was accepted –there was a very significant relationship between frequency of breakfast consumption and cognitive function among college students in Banda Aceh city.

**Keywords:** breakfast, cognitive function, college students

## **BACKGROUND**

Breakfast is one of the most important meals within a day and many studies have found that regular breakfast consumption may have a good impact on both physical and psychological health outcomes (Adolphus, Lawton, & Dye, 2013; Odegaard et al., 2013), such as lower body mass index (Tin, Ho, Mak, Wan, & Lam, 2011), higher nutritional quality (Hallström et al., 2012), and improved appetite control (Leidy, Ortinau, Douglas, & Hoertel, 2012). Besides, people who eat breakfast frequently will perform better in cognitive and psychomotor activity compared to breakfast skippers (Marquez et al., 2012), and in regards to the long-term advantages, regular breakfast consumption with good combination of nutrition might also decrease the risk of depression (Rucklidge, Kaplan, & Mulder, 2015), chronic heart disease, and obesity (Deshmukh-Taskar, Nicklas, Radcliffe, O'Neil, & Liu, 2013).

However, in spite of those beneficial effects, most people tend to skip their breakfast and this prevalence has extremely increased during several years, especially among young adults (Goyal & Julka, 2014). Skipping breakfast may contribute to the detrimental effects on memory and learning, which in turn causes a decrease in academic performance (Cooper, Bandelow, & Nevill, 2011). Perhaps, the deficiencies in particular nutrients,

such as vitamins and minerals lead to a reduction in cognition and concentration (Frisvold, 2014); thus, consuming breakfast is important in order to maintain an academic performance above average.

According to Hallström et al. (2012), individual who skip breakfast at least twice a week is considered as breakfast skipper, and furthermore William (2007) stated that young adults aged 17-24 years old are the highest population of breakfast skippers among other groups. In line with these findings, the study conducted by Soedibyo and Gunawan (2009) also proved that 22.4% of early adults in Jakarta-Indonesia skipped their breakfast routinely. This happened due to various factors, such as laziness (Jensen, 2013), body weight maintenance (Dhurandhar et al., 2014; Martens & Westerterp-Plantenga, 2014), or lack of knowledge about breakfast advantages (Hosseini, Aghamolaei, Gharlipour, & Ghanbarnejad, 2015).

Therefore, based on those explanations above, this current study aimed to measure the association between frequency of breakfast consumption and cognitive function among college students in Banda Aceh city.

## **METHODS**

This research utilized a quantitative research design. The number of participants recruited through simple random sampling technique was 300 college students. In order to measure cognitive function, the Cognitive Functioning Self-Assessment Scale consisting of 18 items was used. This scale was developed by Annunziata, Muzzatti, Giovannini, and Lucchini (2011) and has been tested with a high reliability of 0.856. Breakfast consumption was calculated based on frequency of taking breakfast during the past week. Then, to obtain the results, the data collected was then tabulated and analyzed by the Pearson Correlation. SPSS version 20.0 for Windows was operated to simplify all the statistical calculation processes within this study.

## **RESULTS**

### ***Description of Participants***

Table 1 below will show the demographic data of participants in this study.

Table 1.  
Demographic Data of Participants

No	Description	Category	Total (n)	Percentage (%)	
1.	Sex	Male	143	47.67	
		Female	157	52.33	
2.	University	Universitas Syiah Kuala	85	28.33	
		UIN Ar-Raniry	81	27.00	
		Universitas Muhammadiyah	59	19.67	
		Universitas Serambi Mekkah	32	10.67	
		Universitas Ubudiyah Indonesia	43	14.33	

From table 1 shown above, it clearly mentioned that female respondents (n=157; 52.33%), were more dominant than male respondents (n=143; 47.67%). Based on university, the majority respondents were from Universitas Syiah Kuala (n=85; 23.33%), then followed by UIN Ar-Raniry (n=81; 27.00%), Universitas Muhammadiyah (n=59; 19.67%), Universitas Ubudiyah Indonesia (n=43; 14.33%), and Universitas Serambi Mekkah (n=32; 10.67%).

## ***Categorization of Participants***

### ***Frequency of Breakfast Consumption***

According to Hallström et al. (2012), the frequency of breakfast consumption is categorized into 2 types, namely breakfast skipper and breakfast eater. Breakfast skipper is an individual who eats breakfast only 2 times a week, whereas breakfast eater is an individual who regularly eats breakfast or skips 1 breakfast a week. Based on these categories, the following is the classification of participants based on breakfast frequency.

Table 2  
Categorization of Participants based on Frequency of Breakfast

<b>No</b>	<b>Frequency of Breakfast</b>	<b>Total (n)</b>	<b>Percentage (%)</b>	
<b>1.</b>	<i>Breakfast skipper</i>		<b>194</b>	<b>64.67</b>
		Male	100	51.54
		Female	94	48.46
<b>2.</b>	<i>Breakfast eater</i>		<b>106</b>	<b>35.33</b>
		Male	43	40.56
		Female	63	59.44

Based on table 2 above, it could be noticed that the number of breakfast skippers were 194 students (64.67%), where males (n=100; 51.54%) were greater than females (n=94; 48.46%).

Whereas for breakfast eater category, females were more dominant (n=63; 59.44%) compared to males (n=43; 40.56%). Thus, it can be concluded that men skip breakfast more often than women.

### ***Cognitive Function***

Categorization for cognitive function was sorted based on the size of population standard deviation unit (Azwar, 2015). Because this categorization is relative, the extent of interval covering each desired category can be subjectively revealed as long as the determination is within the reasonable limits. Hence, based on this technique, the categorization of participants for cognitive function was divided into two categories, namely low cognitive function and high cognitive function. The following is the description of participants based on cognitive function categorization.

Table 3  
Data Description on Cognitive Function Scale

<b>Variable</b>	<b>Hypothetical Data</b>				<b>Empirical Data</b>			
	<b>X- max</b>	<b>X- min</b>	<b>Me an</b>	<b>S D</b>	<b>X- max</b>	<b>X- min</b>	<b>Me an</b>	<b>S D</b>
Cognitive Function	72	18	45	9	86	31	52. 70	6. 76

Based on statistical analysis, hypothetical descriptive data showed that cognitive function scale which consists of 18 items had minimum score (X-min) of 18, maximum score (X-max) of 72, mean value (M) of 45, and standard deviation (SD) of 9. Furthermore, empirically, the results of analysis through SPSS version 20.0 for Windows obtained that cognitive function scale which consists of 18 items had minimum score (X-min) of 31, maximum score (X-max) of 86, mean value (M) of 52.70, and standard deviation (SD) of 6.76. After the results of empirical analysis were obtained, the mean value (M) and standard deviation (SD) can be used to attain the categories for each variable, as follows.

Table 4  
Participants' Cognitive Function Categorization

Category	Categorization Formula	Interval	Frequency (n)	Percentage (%)
Low	$X < M - 1,0 \text{ SD}$	$X < 45.94$	215	71.67
High	$X \geq M - 1,0 \text{ SD}$	$X \geq 45.94$	85	28.33

Based on the table above, it can be seen that as many as 71.67% (n=215) had low cognitive function and 28.33% (n=85) had high cognitive function.

### ***Prerequisite Testing***

Before analyzing the data through Pearson Correlation, the initial analysis that required to fulfill is prerequisite testing (Priyatno, 2011). The prerequisite testing conducted in this study were normality testing and linearity testing.

### **Normality Testing**

The results of normality testing were described in table 5 below.

Table 5.  
Normality Test Results

<b>No.</b>	<b>Variable</b>	<b>K-S Z Coefficient</b>	<b><i>p</i></b>
1.	Frequency of Breakfast Consumption	0.960	0.314
2.	Cognitive Function	0.945	0.356

Based on table 5 above, it was found that data for frequency of breakfast consumption was normally distributed with K-S Z coefficient of 0.960 ( $p=0.314$ ;  $p>0.05$ ). While data distribution on cognitive function was also normally distributed with K-S Z coefficient of 0.945 ( $p=0.356$ ;  $p>0.05$ ). As both

variables were normally distributed, the results of this study could be generalized into the whole population.

### ***Linearity Testing***

The results of linearity testing were described in table 6 below.

Table 6  
Linearity Testing Results

<b>Variable</b>	<b><i>F Deviation from Linearity</i></b>	<b><i>p</i></b>
Frequency of Breakfast Consumption and Cognitive Function	0.769	0.778

Table 6 above presented F deviation from linearity of the two variables was 0.769 ( $p=0.778$ ;  $p>0.05$ ), thus, it can be concluded that there was a linear relationship between frequency of breakfast consumption and cognitive function among college students in Banda Aceh City.

### **Hypothesis Testing**

The hypothesis testing was completed by using Pearson Correlation, this analysis could be performed because both variables were normally distributed and linear (as clearly described above). Pearson Correlation was employed to analyze

the relationship between frequency of breakfast consumption and cognitive function among college students in Banda Aceh City. The results of hypothesis analysis can be checked on table 7 below.

Table 7  
Hypothesis Testing Results

<b>Variable</b>	<b><i>Pearson Correlation</i></b>	<b><i>p</i></b>
Frequency of Breakfast Consumption and Cognitive Function	0.395	0.000

Table 7 above showed that the correlation coefficient was 0.395 which was a positive correlation. This presented that there was a positive relationship between frequency of breakfast consumption and cognitive function. This positive correlation also revealed that the more frequent breakfast intake, the better the cognitive function of college students in Banda Aceh city, and vice versa. Moreover, the results from of the analysis displayed a significance value of 0.000 ( $p < 0.05$ ). This indicated that the hypothesis was accepted –there was a very significant relationship between frequency of breakfast consumption and cognitive function among college students in Banda Aceh city.

## **DISCUSSIONS**

The results showed that the majority of students in Banda Aceh city had a low cognitive function category. Other findings also mentioned that most of them were categorized as breakfast skipper, where males were dominant compared to females. In addition, based on the Pearson Correlation results, it was obtained that there was a positive and significant relationship between frequency of breakfast consumption and cognitive function. This implied, the less frequent breakfast intake, the lower the cognitive function, and vice versa. This finding confirms that a regular breakfast taking may improve cognitive function which then affects concentration and memory.

This research findings were in line with several previous study stated that people who eat breakfast frequently will perform better in cognitive and psychomotor activity compared to breakfast skippers (Marquez et al., 2012). Breakfast is generally accepted to be the most important meal of the day and is claimed to confer some benefits for health and cognitive performance. College students who habitually consume breakfast are more likely to have lower body mass index (Tin, Ho, Mak, Wan, & Lam, 2011), higher nutritional quality (Hallström et al., 2012), and improved appetite control (Leidy,

Ortinau, Douglas, & Hoertel, 2012). Despite the wealth of benefits, several observational studies have reported that between 20% and 30% college students skip breakfast for various reasons, such as not having time, being lazy (Jensen, 2013), or dieting (Dhurandhar et al., 2014; Martens & Westerterp-Plantenga, 2014).

Although this research contributed to some advantages, it also had some limitations. First, the subjective measure used was only Cognitive Functioning Self-Assessment Scale, thus, other psychological aspects affected from regular breakfast consumption could not be traced. Besides, as the participants only college students, so the results could not be generalized into other population types, including children or adolescents. Not only that, as the correlation was only utilized to measure the association, the findings were less comprehensive.

## **CONCLUSIONS**

From this study, it was found that the majority of college students in Banda Aceh city were included into breakfast skipper (n=194; 64.67%), where males were more dominant than females with percentage of 51.54% and 48.46% respectively. Within the breakfast eater category, females occupied the majority (59.44%) compared to males (40.56%). This indicated that males skipped breakfast more often than females. For

cognitive function, most of the college students in Banda Aceh City had low cognitive function with a percentage of 71.67%. Furthermore, based on the result obtained from Pearson Correlation analysis, it was found that there was a positive relationship between frequency of breakfast consumption and cognitive function with r-count of 0.395 and a significance of 0.314 ( $p > 0.05$ ). These results inferred that the hypothesis was accepted, which meant the higher the frequency of breakfast consumption, the higher the cognitive function, and vice versa.

## **RECOMMENDATIONS**

The findings from this study give significant contribution to the benefit of regular breakfast consumption on cognitive function. However, based on the limitations mentioned above, there are some points highlighted as the recommendations for further research. First, in order to enrich the results and analyses, the addition of other variables needs to be considered. In addition, future research might also increase the number of respondents, thus the validity and reliability of research results will be improved. Lastly, the using of statistical analysis can be expanded, so the results obtained will be more comprehensive.

## REFERENCES

- Adolphus, K., Lawton, C. L., & Dye, L. (2013). The effects of breakfast on behaviour and academic performance in children and adolescents. *Frontiers in Human Neuroscience*, 424(7), 1-28.
- Azwar, S. (2015). *Metode Penelitian*. Yogyakarta: Pustaka Belajar.
- Cooper, S. B., Bandelow, S., & Nevill, M. E. (2011). Breakfast consumption and cognitive function in adolescent schoolchildren. *Physiology & Behavior*, 103(5), 431-439.
- Deshmukh-Taskar, P., Nicklas, T. A., Radcliffe, J. D., O'Neil, C. E., & Liu, Y. (2013). The relationship of breakfast skipping and type of breakfast consumed with overweight/obesity, abdominal obesity, other cardiometabolic risk factors and the metabolic syndrome in young adults: The National Health and Nutrition Examination Survey (NHANES) 1999–2006. *Public Health Nutrition*, 16(11), 2073-2082.
- Dhurandhar, E. J., Dawson, J., Alcorn, A., Larsen, L. H., Thomas, E. A., Cardel, M., ... & Allison, D. B. (2014). The effectiveness of breakfast recommendations on weight loss: A randomized controlled trial. *The American Journal of Clinical Nutrition*, 100(2), 507-513.
- Frisvold, D. E. (2014). Nutrition and cognitive achievement: An evaluation of the School Breakfast Program. *Journal of Public Economics*, 1-14.

- Giovannini, L., Muzzatti, B., Lucchini, G., Grassi, L., & Annunziata, M. (2011). The Self Assessment of Cognitive Functioning in Cancer Survivor and Healthy People. *Psycho-oncology*, 20.
- Goyal, R., & Julka, S. (2014). Impact of breakfast skipping on the health status of the population. *Indian Journal of Endocrinology and Metabolism*, 18(5), 683.
- Hallström, L., Vereecken, C. A., Labayen, I., Ruiz, J. R., Le Donne, C., García, M. C., ... & Sjöström, M. (2012). Breakfast habits among european adolescents and their association with sociodemographic factors: the HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) study. *Public Health Nutrition*, 15(10), 1879-1889.
- Hosseini, Z., Aghamolaei, T., Gharlipour, G. Z., & Ghanbarnejad, A. (2015). Effect of educational interventions based on theory of planned behavior to promote breakfast consumption behavior in students. *Hormozgan Medical Journal*, 19(1), 35-43.
- Leidy, H. J., Ortinau, L. C., Douglas, S. M., & Hoertel, H. A. (2012). Effects of increased dietary protein at breakfast on appetite control and energy intake throughout the day in overweight 'breakfast skipping' teen girls. *The FASEB Journal*, 26(1), 40-46.
- Marquez, A. P., Forester, S., Witbracht, M., Campbell, C., Gustafson, M., & Keim, N. (2012). Skipping breakfast is associated with lower physical activity energy expenditure in young healthy women. *The FASEB Journal*, 26(1), 820-821.

- Martens, E. A., & Westerterp-Plantenga, M. S. (2014). Protein diets, body weight loss and weight maintenance. *Current Opinion in Clinical Nutrition and Metabolic Care*, 17(1), 75-79.
- Odegaard, A. O., Jacobs, D. R., Steffen, L. M., Van Horn, L., Ludwig, D. S., & Pereira, M. A. (2013). Breakfast frequency and development of metabolic risk. *Diabetes Care*, 36(10), 3100-3106.
- Priyatno, D. (2011). *Buku Saku Analisis Statistik Data SPSS*. Yogyakarta: Media Kom.
- Rucklidge, J. J., Kaplan, B. J., & Mulder, R. T. (2015). What if nutrients could treat mental illness?. *Australian and New Zealand Journal of Psychiatry*, 49(5), 407-408.
- Soedibyo S & Gunawan H. (2009). Kebiasaan sarapan di kalangan anak usia sekolah dasar di poliklinik umum departemen ilmu kesehatan anak FKUI-RSCM. *Sari Pediatri*, 11(1):66-70.
- Tin, S. P. P., Ho, S. Y., Mak, K. H., Wan, K. L., & Lam, T. H. (2011). Breakfast skipping and change in body mass index in young children. *International Journal of Obesity*, 35(7), 899-906.
- Williams, P. (2007). Breakfast and the diets of Australian children and adolescents: An analysis of data from the 1995 national nutrition survey. *International Journal of Food Sciences and Nutrition*, 58(3), 201-216.