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Factors Affecting Breakfast Consumption and its Association with Academic Performance among Undergraduates

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Abstract:

The positive association between breakfast consumption and improved mental health status has been reported in adults. A cross-sectional study was conducted among second year undergraduates of Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Malaysia. Systematic random sampling method was used in selecting the respondents from 10 programmes and a set of questionnaire has been distributed to 180 respondents. Results were analyzed using SPSS version 13.0 software. Factors that significantly affected breakfast consumption and academic performance were environmental factors ($p < 0.05$) which include the aspects of family background, food choices and accessibility. There is no association between habits of taking breakfast and source of education fund. Academic performance of the respondents was associated with the quantity of breakfast consumed in terms of energy and macronutrient contents.

Key words: breakfast, academic performance, undergraduates

Introduction

Breakfast is the first meal of the day and it provides the energy for brain, which improves cognitive function. Insufficient glucose supply to the brain may disturb cerebral function (Fischer et al, 20022). It is often labelled as the most important meal of the day, and it has been associated with successful learning after the long nighttime fasting (Agostoni & Brighenti, 2010). The interval between the evening meal and the breakfast is usually the longest period without energy uptake. Extending this fasting episode by omitting breakfast may result in metabolic changes that interfere with aspects of cognitive functioning and school performance. Missing breakfast may impair the availability of energy or certain nutrients necessary for the synthesis of neurotransmitters, which in turn are necessary for correcting the functioning of the central nervous system (Hoyland et al., 2009).

The consumption of breakfast provides energy to our brain and makes it more energetic. The positive association between breakfast consumption and improved mental health status has been observed in both adults (Keski-Rahkonen et al., 2003) and young adults (Benton & Parker, 1998). Compared with individual who consumed breakfast regularly, those who skipped breakfast were more likely to have an inadequate diet with poorer nutrient intakes and a decreased likelihood of eating lunch or dinner on a regular basis (Bertais et al., 2000). Skipping breakfast was also associated with infrequent exercise (Curie et al., 2004), suggesting that those who skipped breakfast had a less healthy lifestyle than those who did not. Compared with breakfast skippers, students who ate breakfast also had improved behaviour and school performance (Cerbirbay et al., 2011). Although research has consistently shown that breakfast

consumption improved diet quality and adequacy, it remains the most commonly skipped meal (Chandler et al., 1995).

Numerous studies have demonstrated the adverse effect of omitting breakfast on memory capacity (Michaud et al., 1991). The benefits afforded by having a better breakfast have also been reported among groups less favoured in nutritional terms (Cueto, 2011). However, in well-nourished individual, the relationship between habitual breakfast habits and cognitive performances is less clearly established (Vereecken et al., 2009). The objective of this study is to determine the relationship between breakfast consumption and academic performance of second year undergraduate students of Faculty of Health Sciences, National University of Malaysia (UKM).

Methodology

Our targeted respondents comprised of second year undergraduates of Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Kuala Lumpur, except those from Forensic Science programme. They were chosen using systematic random sampling method. A complete name list of the target population was obtained from the academic record office. These programs are the Biomedical Science, Nutrition, Dietetics, Physiotherapy, Occupational Therapy, Speech Science, Audiology, Diagnostic, Imaging and Radiotherapy, Environmental Health, and Optometry. Sample size calculation was done using Krejcie and Morgan (1970) formula. With the assumption of a 10% drop-out rate, the sample size required was 180 subjects.

A pilot study was carried out to test the reliability and validity of the questionnaire. Then, the questions were rearranged and reconstructed. There are four components in the questionnaire. The first part of the questionnaire asked about the socio-demographic information of the respondents. The second part of the questionnaire enquired the factors influencing respondents' breakfast consumption. The third part of the questionnaire asked for the breakfast consumption patterns of respondents, whereas the last part asked about the respondents' perception on their psychosocial aspect with regards to breakfast consumption.

Academic performance is based on Cumulative Grade point Average (CGPA). The student' CGPA used is based on their CGPA of their second year result. In this examination, subject is graded using 4.00 point scale. For the purpose of this study, we categorized it as good grade point being more than 3.00 and the poor grade point is less than 3.00.

Data analysis and results

The association between environmental factor with habit of breakfast consumption is statistically significant. The aspect of family background associated with habit of breakfast consumption with $\chi^2 = 5.05$ and $p < 0.05$. In the aspects of variety of choices and accessibility in terms of location and easiness are associated with habit of breakfast consumption with the same Chi-Square value which is $\chi^2 = 1.64$ and $p < 0.01$. Results are shown in Table 1.

TABLE 1: The association of environmental factors and breakfast habit.

	HABIT	χ^2	*p*
Family Members	Yes	5.05 (df=1)	< 0.05
Family Members	Yes No	5.05 (df=1)	< 0.05
How Easy	Very difficult Difficult Quite easy Easy Very easy	1.64 (df=5)	< 0.01
Where	College cafe Campus cafe Grocery stores Others	1.64 (df=4)	< 0.01
Varieties	Yes No	1.64 (df=2)	< 0.01

Table 2 showed a Pearson's chi-square test of contingencies result on relationship between type of education fund is and habit of breakfast consumption. The chi-square test was not statistically significant, χ^2 (3, N=164) =2.590, $p > 0.05$.

TABLE 2: Association between habit of breakfast consumption and source of education fund

Variables	χ^2	*p*
PTPTN JPA Self Others	2.59 (df=3)	> 0.05

Table 3 showed the relationship between amount of money spent on breakfast per day and the type of education fee. The chi-square test not statistically significant, χ^2 =4.74, p>0.05.

TABLE 3: The association between amount spent on breakfast a day and sources of education fund

Variables	χ^2	*p*
RM0.40-RM1.00		
RM1.00-RM2.00	4.74 (df=9)	> 0.05
RM2.00-RM3.00		
>RM3.00		

We found out that the concentration during lecture was significantly affected by protein and carbohydrate consumed during breakfast. (Table 4)

Table 4: Result of ANOVA test on concentration and the type of nutrient.

Variable	Concentration	F	*p*
	Very poor		
	Poor		
Energy	Good	2.17	> 0.05
	Very good		
	Excellent		
	Very poor		
	Poor		
Protein	Good	3.09	< 0.05
	Very good		
	Excellent		
	Very poor		
	Poor		
Carbohydrates	Good	2.45	< 0.05
	Very good		
	Excellent		
	Very poor		
	Poor		
Fat	Good	0.24	> 0.05
	Very good		
	Excellent		

To compare the quantity of breakfast consumed with academic performance of the subjects, an independent t-test has been performed. Participants were grouped into two distinct groups according to their cumulative grade point average (CGPA) in which the cut-off point was 3.00. Quantity of breakfast consumed was determined in terms of the average density of energy and macronutrients including protein, fat and carbohydrates per 100g of food. Comparison was made between the two groups and the results are as shown in the Table 5. Results were not statistically significant for all four nutrients, p > 0.05.

Table 5: Comparison between group of undergraduates with CGPA >3.00 and group with CGPA <3.00 in quantity of breakfast consumed.

	t-test for Equality of Means	
	t	*p*
Energy	-0.195	> 0.05
Protein	0.011	> 0.05
Fat	-0.874	> 0.05
Carbohydrates	0.362	> 0.05

Pearson correlation test has been used to determine the correlation between the quantities of breakfast consumed with academic performance of the respondents. The quantities of energy, protein, fat and carbohydrate consumed by the respondents were correlated with their academic performance in terms of

CGPA (Table 6). Results are statistically not significant for all four test performed. Bivariate correlations between the quantities of nutrients and CGPA did not demonstrate significance.

Table 6: Correlation between the quantity of breakfast consumed and academic performance

	Pearson Correlation coefficient (ρ)	*p*
Energy	-0.073	0.353
Protein	0.061	0.436
Fat	-0.014	0.855
Carbohydrate	0.106	0.176

Discussion

Based on our findings, each and every of the environmental factors were significantly associated with the habit of breakfast consumption. For the family background, our results are in line with Doku et al. (2011) which reported that a family structured, parental education was the most statistically significant predictor of breakfast eating (Hallströml et al., 2011). Our outcome also supported by the research of Rahkonen et al. (2003) where adolescent breakfast consumption in Finland has been reported to be associated with parental breakfast consumption (Lennernas et al., 1997). In the aspect of accessibility, our result showed that respondents' habit of breakfast consumption were associated with the location and easiness to get their breakfast. Another evidence from school breakfast programme done by University of Wisconsin-Extension, Cooperative Extension, Family Living Program found out that "no time", "do not like the food choices offered" and "no food at home were the reasons for breakfast skipping (Melanson, 2008). It is clearly seen that low accessibility might lead the respondents to breakfast skipping. Both location and easiness are inter-related. In the aspect of variety of food choices which associated with respondents' breakfast consumption habit, it depends on personal preferences. In our result, nearly half of the respondents claimed that the location they obtained their breakfast have a variety of choices, while the rest think oppositely. Lennernas et al. (1997) revealed that the socio-cultural norms were different between southern Europe and the northern/central part (Nicklas et al., 2004). Generally, adolescents from South region were more influenced by their parents regarding health care, the school and friends. Meanwhile Northern and central European adolescents were more influenced by hunger, ease of preparation and availability in their choices of food in breakfast consumption (Pollitt & Mathews, 1998).

In our findings, there was no significant association between habit of breakfast consumption and sources of education fee among the respondents. Besides, there was no significant association between amount of money spending on breakfast per day and sources of education fee too. Speculation made and the reason may be due to the different wills in spending their money on breakfast.

Based on the result, protein and carbohydrates played a role in concentration during the lectures. A finding by Fischer et al. (2002) suggested that the carbohydrate to protein ratio in foods specifically influenced higher cognitive functions in the morning (Rampersaud et al., 2005). The overall accuracy in short-term memory was best after a protein-rich meal, presumably because of less variation in glucose metabolism or higher modulation in Large Neutral Amino Acid ratios as indicated by the overall anti-glucagon immunoreactivity (Fischer et al., 2002).

There have been studies on the impact of breakfast in respect to academic performance. The role of breakfast consumption in elevating academic performance has been proven. Pollitt *et al* (1983) concluded that the timing and nutrient composition of meals have acute and demonstrable effects on behaviour Sampson et al., 1995). Another study by Michaud et al., (1991) supported that high energy breakfast yield a beneficial effect in short-term memory. Nonetheless, the same study also suggested that a high caloric breakfast appeared to impair concentration (Cueto et al., 1998). Wesnes et al., (2003) also concluded that a cereal breakfast rich in complex carbohydrates helps to maintain mental performance compared to a glucose drink as breakfast (Serra-Majem et al., 2001)

The quality of breakfast cereal consumed in the morning in terms of glycemic index (GI) has an effect on the attention and memory (Smith, 2003). A low-GI cereal releases glucose slowly and steadily into the blood, providing a sustainable glucose supply to the functions of body and brain. On the other hand, high-GI cereal will release glucose in a faster manner, giving a surge in blood glucose concentration. Result from the study conclude that accuracy of attention and secondary memory declines throughout the morning and this decline can be reduced significantly with by taking a low GI cereal rather than high GI cereal. This shows that glucose is important and eating breakfast is important in maintaining performance. These studies provide an insight on the importance and relation of breakfast and academic performance. In our study, the results were found to be contradict with most studies. Nonetheless, one study suggesting that glucose level

does not associate with performance. Cueto et al. (1998) conducted a study on 54 elementary school boys in Peru using six tests of cognition observed that individual glucose level does not affect the test performance (Smith, 1998). In our findings, academic performance of the respondents was not affected by the quantity of breakfast in terms of energy and macronutrients. In this study, we focus only on the associations between macronutrients and academic performance. However, the role of micronutrients in determining academic performance may be more prominent as compared to macronutrient. For example, Melanson (2008) found that vitamins and minerals have effectively improved cognitive abilities and scores on intelligence tests o

Conclusion

The environmental factors, family background, variety of choices and accessibility in terms of location and easiness to get the food were associated with breakfast consumption,. Besides that, the concentration during lecture was associated with protein and carbohydrate consumption during breakfast. More researches regarding the relationship of breakfast consumption and academic performance need to be conducted to other universities and colleges so that the relationship can be better understood. The consumption of energy dense and nutrient dense during breakfast consumption on the effect of academic performance may also be recommended for future research.

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