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Impacts of Consumption of Meal on Academic Achievement in Basic Science among Junior Secondary Students in Rivers State

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Abstract. This study examined the impact of meal consumption on junior students' academic achievement in basic science. It is a cross sectional study carried out on 1960 students who enrolled and stayed in their school for at least two years. They were selected from 24 public Junior Secondary Schools in three senatorial districts in Rives State. They responded to a meal time survey scale (MTSS) used to obtain data on the rate of meal intake. Average score of two years Basic Science examination results of the students was taken as the measure for academic achievement. The results were collected from the student's schools and the average score determined to indicate the achievement level of each of the participants. Percentage, mean and Anova were the statistical tools used in data analysis. Results showed that majority of the students do skip their breakfast and lunch but had their dinner. It also showed that daily eating of breakfast, lunch and dinner significantly ($p<.05$) promotes academic achievement of students. Thus we recommended that parents should ensure that their children or ward regularly consume breakfast, lunch and dinner on daily basis. Also, government should implement the school free feeding programme.

Keywords: Meal consumption, Basic science, Academic achievement, Junior Secondary School.

1. Introduction

The rising knowledge of the value of nutrition in the promotion of growth, good health, disease prevention as well as in the enhancement of general physiological and psychosocial well being of man has led to a greater concern about the kinds of food and the feeding patterns of man especially the young ones-school children and adolescents. Food can be characterized as any solid or liquid substance which when taken into the body supplies the body with chemical substances called nutrients, which are necessary for the body to carry out its functions. The nutrients in food are generally classified into six, which are carbohydrates, proteins, lipids (fats), vitamins, minerals and water. Essentially, food is eaten for the purpose of gaining energy, growth, repair and replacement of worn out tissues as well as for the overall maintenance and regulation of various activities in the body.
The importance and benefits of food in the human body have been documented. Davis, Melina and Berry (2010) reported that the cells in the human body got energy from food calories in the form of macronutrients from carbohydrates, proteins and fats. According to them the recommended total daily calories should include 45-65% of carbohydrates, 12-20% from proteins, and 20-35% from fats.

Food reinforces the body with energy, vitamins, and minerals which are concern with processes that promote neuronal survival (Paus,2010), and promote the syntheses of neurotransmitters which have to do with the efficient flow of information across synapses (Gómez-Pinilla, 2008). Deficiencies or excesses of certain micronutrients can lead to nerves damage in the brain, and thus bring about alterations in memory, impairment of brain function and reduction in the ability to solve problems (Gustafson, 2010). Vitamins and minerals are also very essential in humans even though they are needed in small amounts (Sorhaindo and Feinste, 2006). They help in the production of energy, give support to the walls of blood vessels, promote good vision, bone formation, and have antioxidant functions (Brown, Beardslee and Prothrow-Stith, 2008). Minerals also play a role in maintaining water balance, bone formation and strength, stability of protein structure and immune responses ((Gustafson, 2010). Food is taken for the overall nourishment of the body and for the promotion of healthy living. This can only be achieved through proper dieting such as taking a balanced diet and eating regularly at normal mealtime otherwise malnutrition will occur. Poorly fed children are more prone to death and when they are alive they are likely to experience ill- health and stunted growth rate, and will not be capable to face academic work.

2. Theoretical Framework of the Study

This study relies on Maslow's hierarchy of individual's need. It provides the framework for the conceptualization and understanding of the relationship existing between nutritional needs or food and academic achievement.

Abraham Maslow's (1943) arranged human needs in hierarchical manner from the simple or basic to intricate needs in increasing order of importance as physiological needs, safety needs, belongingness and love needs, esteem needs, and the need for self-actualization. Maslow (1943) describes the body's physiological need for food, especially in terms of maintaining homeostasis of water, salt, macronutrients, vitamins, minerals, and temperature within the bloodstream. Achievement which simply connotes attainment, success or accomplishment is the desire of every individual because everyone has a need for self-esteem i.e. need to be regarded, valued recognized or respected. According to Maslow, man's primary need is the physiological need that must be satisfied, without which every other need is unimportant. In addition, Maslow opined that once the needs at the lower level are met or satisfied, needs at higher levels begins to surface and governs the individual's thoughts and actions because the satisfaction of lower needs drives one towards higher needs. Going by the Maslow's hierarchy of need, the need for achievement will not drive an individual's thoughts and actions until the basic physiological needs (nutritional needs or food) are gratified. This presupposes that a hungry student cannot be driven to engage in any meaningful learning activities that require one's cognitive processes, attentiveness, alertness, active engagement, and concentration to achieve academic success until he or she is well fed. And so, Maslow's hierarchy establishes an association between food and academic achievement.

3. Eating Habit and Academic Achievement

A review of the link between dietary intake and achievement carried out by Burrows, Goldman, Pursey and Lim (2017) showed that the overall quality of diet correlate with academic achievement of children and adolescent. Again studies on the influence of nutrition on achievement of school children has established that malnourished children or children who eat imbalanced or unhealthy diets exhibits certain kind of behaviours that can hamper learning and academic performance (Kleinman et al., 1998; ASFSA,1989; Parker, 1989). Such bahviour problems may include irritability, apathy, inattentiveness, and lower self-esteem. Research also reveals that the level of children nutrition can directly modify mental ability of school-aged children. For example, hunger following insufficient food consumption is reported to be related with lower grades, higher rates of absenteeism, repetition of class or a grade, and inability to focus or pay attention among students (Taras, 2005; Pollitt, Cueto and Jacoby,1998; Alaimo, Olson and Frongill, 2001).

Lieberman (2003) noted that amino acid and carbohydrate can enhance perception and reasoning. Iron deficiency can decrease the transmission of dopamine and thus, affects cognition adversely (Pollitt,1993). Lack of or inadequate intake of fruits, vegetables, or dairy products is linked with lower grades among students (MacLellan, Taylor, and Wood, 2008; Neumark-Sztainer, Story, Resnick ,and Blum,1996). Also, deficiencies in vitamins and minerals such as thiamine, vitamin B, vitamin E, iodine, and zinc have been reported to impair cognitive abilities and mental attentiveness (Gustafson, 2010; Chenoweth, 2007). In addition, deficits of some vitamins like vitamin A, B6, B12, C, folate and minerals such as iron, zinc, and calcium are correlated with lower grades and higher rates of absenteeism and lateness among students (Taras, 2005; Kleinman et al.,2002). Furthermore, research showed evidence of improved academic grades and standardized test scores, reduced absenteeism, and increased cognitive performance (e.g. memory) of student following student participation in the United States Department of Agriculture (USDA) School Breakfast Program (Bradley and Green,2013; Taras, 2005).

Literature have also proved that the most researched meal time and its impact on learning is the breakfast. Breakfast is the first meal taken in the morning of each day. It is the meal that provides the first source of nutrients and energy for the day, and so helps the brain deal successfully with the demands of the morning (Bellisle, 2004). Eating breakfast can enable the brain acquire the nutrients and energy necessary to function effectively to promote mental and body coordination as well as cognitive activities such as thinking, memory, attention and learning. According to Marquez et al (2001) performance of children on vigilance attention, logical reasoning, arithmetic and problem solving is improved once children consume breakfast. To Vishnukumar, Sujirtha and Ramesh, (2017), Adole and Ware (2014), Gajre, Fernandez, Balakrishna and Vazir (2008), Widenhorn-Müller, Hille, Klenk and Weiland (2008) eating breakfast is correlated with learning outcome and better performance of school children in school activities. Skipping breakfast was also found to have relationship with decreased cognitive performance (such as rate of alertness, attention, memory, processing of complex visual display, problem solving) among students (Gajre, Fernandez, Balakrishna and Vazir,2008; Widenhorn-Müller, Hille, Klenk and Weiland, 2008; Benton and Jarvis, 2007).

Adole and Ware (2014) carried out an assessment on the association between breakfast eating habits and cognitive performance of early adolescents in Shebedino District, Sidama Zone, Southern Ethiopia. In the study a sample of 211 early adolescents aged 11 – 13years old randomly selected from 4 kebeles responded to both questionnaire that assesses breakfast eating habits, socio-economic and demographic factors, and Kaufman Assessment Battery for Children -II tests used to measure cognitive performance. Results indicated significant association between regular breakfast eating habits and Simultaneous scale and Pattern Reasoning ($P<0.001$), mother education ($P<0.001$), and Sequential scale accounting for 13.7% variation. It is also significantly associated with Pattern Reasoning accounting for 31.6 % variation.

Vishnukumar, Sujirtha and Ramesh (2017) carried out an exploratory cross sectional study to assess and compare the nutritional status, academic achievement and behaviour of school going children eating breakfast and those skipping it. The study was conducted using a sample size of 195 school going students within the age range of 10-16 years old obtained from selected schools in Batticaloa district of Sri Lanka. In the study data on background characteristics and breakfast consumption habits were collected using questionnaire while data on the children's food intake was obtained using the 24-hour dietary recall method. From the results of the study, the researchers found that breakfast skipping was common among school going children. Again, they found significant difference in a number of parameters like memory ($p<0.01$), concentration ($p<0.01$), grades obtained ($p<0.01$), attendance ($p<0.01$) amidst others, between breakfast skippers and non-breakfast in favour of the non-breakfast skippers. The study therefore reveals that skipping breakfast negatively influences the nutritional status as well as the school performance of the students.

4. Statement of the Problem.

Although there is increased evidence of the impact of diet, nutrition, or feeding habits on academic achievement or the relationship among them in advance countries with developed and better economies, the impact of diet and nutrition on school performance in developing countries is somewhat knotty to assess and can be explained by several factors such as home/parent related factors, school factors, teacher and student related variables among other variables. Different reviews indicate that only few studies have investigated the relationship between breakfast skipping and cognitive performance in adolescents in different countries (Hoyland, Dye and Lawton, 2009., Rampersaud, 2009., Taras, 2005). But none of the studies takes a comprehensive assessment of the impact of feeding habits and the frequency of meal time eaten (i.e. breakfast, lunch and dinner) per day on academic achievement.

Again, While studies on the effect of diet, nutrition or feeding pattern on students' performance have been conducted in different countries, empirical studies on the impact of consumption of breakfast, lunch and dinner on academic achievement among Nigerian primary and secondary schools children are scarce. Hence this present study is conducted in Rivers State, Nigeria to assess the impact of meal on academic achievement among school children and adolescents

5. Objectives of the Study

- To investigate how often students eat breakfast, lunch and dinner in a week
- To determine the mean academic achievement of students with respect to rate of consumption of Breakfast (B) per week.
- To determine the mean academic achievement of students with respect to rate of consumption of Lunch (L) per week
- To determine the mean academic achievement of students with respect to rate of consumption of Dinner (D) per week
- To determine the mean academic achievement of students with respect to the number of meal consumed per day.

6. Research Questions

- How frequent do students eat each of breakfast, B., lunch, L; and dinner, D per week?
- What is the mean academic achievement of students with respect to rate of consumption breakfast?
- What is the mean academic achievement of students with respect to how regular they consume lunch per week?
- What is the mean academic achievement of students with respect to rate of consumption of dinner per week?
- What is the mean academic achievement of students with respect to the number of meal (BLD, BL, BD and LD) consumed per day?

7. Null Hypotheses

HO_1: There is no significant difference in the mean academic achievement score among students with respect to how regular they have their breakfast.

HO2: There is no significant mean difference in the academic achievement score among students with respect to rate of consumption of lunch per week.

HO3: There is no significant mean difference in the academic achievement score among students with respect to rate of consumption of dinner per week.

Ho4: There is no significant difference in the mean academic achievement score among students with respect to the number of meals consumed per day.

8. Methodology

The study is an exploratory one. It adopted exploratory cross-sectional survey research design. This design is chosen because it allows for the collection of information from the sample only once. In this design, a researcher can only have a once for all observation of the independent variable without the manipulation or control of the variable.

8.1 Sample

1960 students who enrolled and stayed in their school from JS1- JS3 were selected from twenty (24) State owned Junior Secondary Schools in six local Government Areas of Rivers State. The schools were selected through stratified random sampling procedure based on the stratification of the state into three senatorial districts.

8.2 Method of data collection and Analysis

Data were collected through the administration of Mealtime Survey Scale (MTSS) on the students. The MTSS was designed by the researchers and administered to the students with the assistance of their class teachers as to generate data on students' feeding habits. The students were properly guided on how to respond to the items on the MTSS.

Average score of two years Basic Science examination results of the students (participants) was taken as the measure for academic achievement. The results were collected from the student's schools and the average score determined to indicate the academic achievement level of each of the participants.
Data obtained were analyzed using simple percentages and mean to address the research questions while one-way analysis of variance was used to test the research hypotheses.

9. Results

Research Question 1: How frequent do students eat breakfast, B., lunch, L; and dinner, D per week?

Table 1: Students' Response on the frequency of their meal time (Breakfast, Lunch and Dinner) per week

S/No.	Item Statement	Response			
	Section B: Meal time. How regular do you	**Daily (7days/week**	**5-6 days/ Week**	**3-4 days/ Week**	**1-2 days/ week**
1	Eat your breakfast, B?	450 (22.96%)	390 (19.90%)	502 (25.61%)	618 (31.53%)
2	Eat your lunch, L?	158 (8.06%)	490 (25.0%)	688 (35.10%)	624 (31.84%)
3	Eat your dinner, D?	497 (25.36%)	699 (35.66%	684 (34.90%	80 (4.08%)
	Section C: Available number of Meal time. As a student	**BLD**	**BL**	**BD**	LD
4	Which of this meal time do you have on daily basis?	450 (22.96%)	278 (14.18%)	732 (37.35%)	500 (25.51%)
		Breakfast	**Lunch**	**Dinner**	
5	if you cannot eat breakfast, lunch and dinner (BLD) daily, which of these meal times will you prefer to skip most days?	610 (31.12%)	879 (44.85%)	471 (24.03%)	
		BL	**BD**	**LD**	
6	if you are given an opportunity to choose two meal times, which of the two meal time will you choose?	306 (15.61%)	1044 (53.27%)	610 (31.12%)	

Results in table 1 showed that 22.96% of the participants had their breakfast daily, 19.90% agreed having theirs between 5-6days/week, and 25.61% often have their breakfast between 3-4 days/week while 31.53% of the participants had theirs between 1-2 days/week. This means that majority of the participants do often skip breakfast. On the consumption of lunch, 8.06% of the participants indicated consuming lunch daily, 25% indicated having theirs 5-6days/week, 35.10% showed that they consume it 3-4days/week, and 31.84% agreed having it 1-2days/week. Again, this revealed that above half of the participants do skip lunch. The table also showed that 25.36% of the participants are daily dinner eaters, 35.66% indicated having their dinner 5-6days/week, 34.90% indicated eating their dinner 3-4days/week, and 4.08% indicated having theirs 1-2days/week. This means that majority of the participants do not skip dinner.

Regarding the number of meal available per day, table 1 also showed that 22.96% indicated consuming breakfast, lunch and dinner, BLD., 14.18% indicated eating only breakfast and lunch, BL., 37.35% indicated often consume only breakfast and dinner, BD, and 25.51% eat only lunch and dinner, LD. This showed that majority of do not had regular meal per day. In addition, responses to item 5 which addresses meal that students would preferred to skip most days indicated that 31.12% of the participants preferred to skip breakfast, 44.85% preferred to skip lunch while 24.03% preferred skipping dinner most days. More so, with regard to students' preferred two meal time (item 6), table 1 indicated that 15.61% indicated preference for breakfast and lunch, BL., 53.27% had preference for breakfast and dinner, BD while 31.12% preferred lunch and dinner, LD

.

Research question 2: What is the mean academic achievement of students with respect to rate of consumption breakfast?

Table 2: Mean academic achievement of students with respect to breakfast consumption

Groups	Mean	N	Std. Deviation
Daily (7days/week)	61.6111	450	17.05114
5-6 days/week	58.2513	390	17.02526
3-4 days/week	50.8865	502	16.29852
1-2 days/week	49.1327	618	14.51357
Total	54.2612	1960	16.88991

Table 2 showed that those who often had their breakfast had the highest mean achievement (61.6111, SD=17.05), students that had breakfast 5-6days/week had mean =58.2513, SD=17.02526., students that on the average consume their breakfast 3-4 days/week had mean 50.8865, SD=16.29852 while those who often had theirs between 1-2days per week had mean=49.1327, SD =14.51357. This indicates that the mean academic achievement decreases wit decrease in the rate of consumption of breakfast.

HO_1: There is no significant difference in the mean academic achievement score among students with respect to how regular they have their breakfast.

Table 3: ANOVA of mean difference in academic achievement of students with respect to breakfast consumption.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig. (p-value)
Corrected Model	13381.216[a]	3	4460.405	22.833	.000
Intercept	4619321.750	1	4619321.750	23646.667	.000
Groups	13381.216	3	4460.405	22.833	.000
Error	382100.085	1956	195.348		
Total	5722083.000	1960			
Corrected Total	395481.302	1959			

a. R Squared = .034 (Adjusted R Squared = .032)

Data in table 3 showed that the difference in mean academic achievement is significant, F=22.833, P<.05. And so, HO_1 was rebuffed. Multiple comparison of the difference in mean achievement using LSD revealed that only the mean difference in academic achievement between students who consume breakfast 3-4days/week and those that consume theirs 1-2days/week was not significant (mean diff =1.7538, p=.07 whereas all others showed significant difference.

Research question 3: What is the mean academic achievement of students with respect to how regular they consume lunch per week?

Table 4: Mean academic achievement of students with respect to rate of consumption of lunch per week

Groups	Mean	N	Std. Deviation
Daily (7days/week)	60.5380	158	17.08750
5-6 days/week	57.7735	490	17.98408
3-4 days/week	51.2558	688	17.46083
1-2 days/week	49.2099	624	14.55666
Total	52.9821	1960	17.15706

Table 4 showed that those who usually take their lunch daily had the highest mean achievement (60.5380, SD=17.08750), while the students that had breakfast 5-6days/week had mean=57.7735, SD =17.98408, and the mean academic achievement of students that consume their lunch 3-4 days/week is 50.8865, SD=16.29852 while those had their lunch 1-2days per week was mean=49.1327, SD =14.51357. This means that the mean academic achievement decreases wit decrease in the rate of consumption of lunch.

HO2: There is no significant mean difference in the academic achievement score among students with respect to rate of consumption of lunch per week.

Table 5: ANOVA of mean difference in academic achievement of students with respect to consumption of lunch per week

Source	Type III Sum of Squares	Df	Mean Square	F	Sig. (P-value)
Corrected Model	31198.773[a]	3	10399.591	37.292	.000
Intercept	4189001.658	1	4189001.658	15021.566	.000
Groups	31198.773	3	10399.591	37.292	.000
Error	545461.602	1956	278.866		
Total	6078591.000	1960			
Corrected Total	576660.375	1959			

a. R Squared = .054 (Adjusted R Squared = .053)

ANOVA test for significant difference in mean academic achievement among the groups of the students with respect to how regular they had their lunch per week (table 5) showed that the mean difference was significant, F=37.292,p<.05.Therefore, HO_2 was rejected. Multiple comparisons of the difference in mean achievement using LSD revealed that apart from the mean difference in academic achievement between students who consume lunch daily and those that consume lunch 5-6days/week that was not significant (mean diff =2.7645, p=.071, all other comparisons were significant. Multiple comparisons of the difference in mean achievement among the groups of students with regards to their habitual lunch revealed that the difference in mean achievement between students that had their daily lunch and those that normally have theirs 5-6 days/week was not significant (mean diff=2.7645, p>.05) whereas all other comparisons showed significant difference.

Research question 4: What is the mean academic achievement of students with respect to rate of consumption of dinner per week?

Table 6: Mean academic achievement of students with respect to rate of consumption of Dinner per week

Groups	Mean	N	Std. Deviation
Daily (7 days/week)	59.9819	497	17.71941
5-6 days/week	51.7783	699	17.99421
3-4 days/week	49.7266	684	14.29832
1-2 days/week	47.8500	80	16.13480
Total	52.9821	1960	17.15706

Table 6 showed that the highest mean achievement score (59.9819, SD=17.71941) was for students who regularly have their dinner daily, while the students that had dinner 5-6 days/week had mean=51.7783, SD =17.99421, and the mean academic achievement of students that consume their dinner 3-4 days/week was 49.7266, SD=14.29832 while those that normally have their diner 1-2days per week had mean=47.8500, SD =16.13480. Thus, the result here indicates that mean academic achievement of students decreases with decrease in the rate of students' consumption of dinner.

HO_3: There is no significant mean difference in the academic achievement score among students with respect to rate of consumption of dinner per week.

Table 7: ANOVA of mean difference in academic achievement of students with respect to the rate of consumption of dinner

Source	Type III Sum of Squares	df	Mean Square	F	Sig. (p-value)
Corrected Model	34720.833[a]	3	11573.611	41.772	.000
Intercept	2517822.044	1	2517822.044	9087.471	.000
Groups	34720.833	3	11573.611	41.772	.000
Error	541939.542	1956	277.065		
Total	6078591.000	1960			
Corrected Total	576660.375	1959			

a. R Squared = .060 (Adjusted R Squared = .059)

Table 7 showed that the differences in mean achievement among the groups of students with respect to how regular they had their dinner was significant ($F=41, p<.05$). And so, HO_3 was not retained. Multiple comparison of the difference in mean achievement using LSD indicated the mean difference in academic achievement between students who had their dinner 3-4days/week and those that consume theirs 1-2days/week was not significant (mean diff =1.8766, $p>.05$) whereas the rest comparisons showed significant difference.

Research question 5: What is the mean academic achievement of students with respect to the number of meal (BLD, BL, BD and LD) they eat per day.

Table 8: Mean academic achievement of students with respect to the number of meals eaten daily.

Meal Groups	Mean	N	Std. Deviation
Breakfast, Lunch and Dinner, BLD	55.013	450	13.802
Breakfast and Lunch, BL	46.302	278	13.257
Breakfast and Dinner, BD	53.663	732	14.590
Lunch and Dinner, LD	52.028	500	14.162

Data in table 8 revealed that students in the meal group, BLD had the highest mean academic achievement score (mean =55.013, SD= 13.802) followed by those in the group BD (mean=53.663, SD=14.590) then the group, LD (mean=52.028, SD=14.162) while those students in the meal group, BL had the lowest mean (mean=46.302, SD=13.257).

Ho4: There is no significant difference in the mean academic achievement score among students with respect to the number of meals consumed per day.

Table 9: ANOVA of difference in mean academic achievement score among students with respect to the number of meals consumed per day

Source	Type III Sum of Squares	Df	Mean Square	F	Sig. (p-value)
Corrected Model	14621.929[a]	3	4873.976	24.451	.000
Intercept	4665143.250	1	4665143.250	23402.900	.000
Group	14621.929	3	4873.976	24.451	.000
Error	389909.801	1956	199.340		
Total	5809197.000	1960			
Corrected Total	404531.730	1959			

a. R Squared = .036 (Adjusted R Squared = .035)

Table 9 showed that mean difference in academic achievement among students based on the number of meal consumed per day was significant (F=24.451, p<.05.

Using Least Significant Difference multiple comparisons of the difference in mean achievement among the groups of students with regards to their habitual number of mealtime per day revealed that the difference in mean achievement between students that had their daily breakfast, lunch and dinner (BLD) and those whose regularly had breakfast and dinner alone as their daily meal was not significant (mean diff=1.3508, p>.05) whereas all other comparisons differ significantly.

10. Discussion of Results

Results showed that greater percentage of the students do skip their breakfast and lunch daily and eat dinner. Meal skipping especially breakfast has been reported to be common among school children and adolescents (Vishnukumar, Sujirtha and Ramesh, 2017). This could be linked to students rushing to avoid lateness to school and or no food on the table due to some familial factors like socioeconomic status of parent amongst others. With regards to the number of meal available per day for students, above 70% of the students do not regularly eat meal per day as only 22.96% of them indicated that they usually consume three time meals- breakfast, lunch and dinner per day while the rest consume two time meals. One interesting result of this study is the preference of students to skip a meal in the event they have a need to do so. Above 40% of the students preferred to skip lunch. Again, considering the students' preferred two meal per day in the event they cannot have three time meal, 53.27% of them preferred to consume breakfast and dinner, BD, while 31.12% preferred lunch and dinner**,** and 15.61% indicated preference for breakfast and lunch. The high preference for BD is likely to be associated with their perceived importance or benefits of breakfast and dinner in promoting students engagement in classroom activities and night prep/studies respectively. Significant differences was observed in the mean academic achievement among students with respect to consumption of breakfast, lunch as well as in the consumption of dinner as students who regularly consume breakfast daily were found to have significantly higher mean academic achievement than did those students who consume breakfast 5-6days/week, 3-4days/week, and 1-2days/week. The same trend was observed for those regularly consume lunch and dinner. This finding concurs previous studies in children and adolescents that made it known that regular eating of morning meal promotes better academic achievement (Vishnukumar, Sujirtha and Ramesh, 2017., Adole and Wuse, 2014). Rampersaud (2009) and Alaimo, Olson, and Frongillo (2001) presented that regular eating of breakfast enhances standardized test score, problem solving, cognitive and memory performance among school children. Eating breakfast can increase the rate of cognitive processes and functions such as episodic memory, attentiveness, concentration in class and in other academic activities and hence improved learning and academic achievement while lack of or irregular breakfast can interfere and impede cognitive processes and lead to poor academic achievement among school children. In addition, the observed significant impact of breakfast, lunch and dinner on academic achievement suggests that with regular meal intake students are better able to stay and learn in class and at home, experience decreased rate of absenteeism and less behavioural disorder and hence improve in their academic achievement.

11. Conclusions

This study has indicated that adequate meal is sine qua non to academic achievement of students in basic science. It revealed that there is significant difference in students' achievement with respect to rate of consumption of each of breakfast, lunch and dinner in a week. Again, significant difference in academic achievement was observed among students with respect to the number of meal they consume per day. It showed that students that regularly eat breakfast, lunch and dinner daily had higher and significant academic achievement than did students who eat only breakfast and lunch daily, and those who only eat breakfast and dinner daily as well as those who eat only lunch and dinner daily. The study also showed that students had more preference for breakfast and dinner as two meals they will not like to skip daily.

12. Recommendations

Regular meal intake is very necessary for promoting ideal cognitive development, cognitive processes and learning as well as academic achievement and so there is the need to accord appropriate attention to regular consumption of meal.

Thus we recommend that:

- Parent should ensure that their children or ward regularly consume breakfast, lunch and dinner on daily basis.
- Government should implement the school free feeding programme

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