

Role Of Breakfast, BMI And English Language Proficiency On Academic Performance Of Undergraduate Dental Students: A Cross-Sectional Study

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Abstract

Aim : To assess the role of breakfast, BMI and English Language Proficiency on academic performance of undergraduate students.

Objective : To investigate the trend of skipping breakfast among students, to calculate the BMI of undergraduate students and to assess the level of proficiency of English Language through English test and to relate all these parameters to academic performance.

Methodology: The sample population was chosen from the undergraduate students in PIDC which involved 68 undergraduate students. All respondents chosen were willing to complete survey questions including a test given and were of Year Three and Year Four dental students who had have completed their respective final year exams and obtained their CGPA. For data collection, these students were given the questionnaire and an English test in the morning which were completed within an hour. The questionnaire was to assess their breakfast habits and BMI while the English test was to assess their English language proficiency. The questionnaire had two parts and after the chosen respondents had answered the questions, they then took the English Proficiency test. Data collected were analysed with SPSS for Pearson correlation and p-values.

Results: 61.76% of students were non-breakfast skippers with 38.24% being breakfast skippers, 51.47% of students scored excellent in English test, 19.12% scored very good, 17.65% scored good and remaining 11.76% scored satisfactory. According to the BMI scale, 70.59% of students belonged to normal BMI category, 17.65% belonged to obese category, 8.82% belonged to underweight category and the remaining 2.94% belonged to the severely underweight category. According to Pearson Correlation test, it was found that there were significant correlations between breakfast habit and English language proficiency to academic performance. However, for BMI there was a weak correlation to academic performance.

Conclusion: There were significant correlations between breakfast habit and English language proficiency to academic performance of undergraduates in PIDC. However, the study showed a non-significant correlation between BMI to academic performance. Since the p-value is less than our chosen signification alpha value = 0.05, we rejected

the null hypothesis and concluded that academic performance is dependent on breakfast habit and English Language proficiency in undergraduates of Penang International Dental College. We would like to emphasize on the importance of promoting and implementing strategies that focus on breakfast intake and English language proficiency in students including primary and secondary school youths as academic performance should be enhanced since young age. Nutritional health programs and English book fairs can be carried out in those schools in order to achieve this.

Keywords—*undergraduate; Breakfast habit; BMI; CGPA; English Language*

I. INTRODUCTION:

Academic performance or academic achievement is the outcome of education, the extent to which a student, teacher, or institution has achieved their education goals. Academic performance is important as it prepares students for future careers. It also allows students to enter competitive fields. It is often a sign of a refined intellect, which can help students in all aspects of their lives[1].

There are many factors that may affect the academic performance of students according to several studies done. These include breakfast habits, body mass index (BMI), proficiency in English Language, peer pressure, sleep quality, support and availability of parents, geographical location of educational institution[2].

There are very few researches done to study the relationship between breakfast skipping, BMI, and English Language proficiency on the academic performance of undergraduate students.

Hence, we investigated the role of these three factors on academic performance of students so that the results of this study may be useful for future interventions in the dental school[3-12].

Aim :

To assess the role of breakfast, BMI and English Language Proficiency on academic performance of undergraduate students.

Objective :

- To investigate the trend of skipping breakfast among students and the effects if they skip breakfast on academic performance

- To find out the awareness of students on importance of breakfast
- To calculate the BMI of undergraduate students and its relation to the academic performance
- To assess the level of proficiency of English Language through English test and its effect on academic performance of students

II. Materials and Methodology

The purpose of this study was to assess the role of breakfast, BMI, and English Language Proficiency on academic performance of undergraduate students. This was a cross – sectional study performed among undergraduate students (PIDC).

The sample population was chosen from the undergraduate students in PIDC involving 68 respondents, 49 females and 19 males. All respondents chosen were willing to complete survey questions and test given and were of Year Three and Year Four dental students who had completed their respective final year exams and had obtained their CGPA. For data collection, these students were given the questionnaire and a test in the morning which were completed within an hour.

This specialized questionnaire was designed for the study and along with it an English test was included. The questionnaire was to assess their breakfast habits and BMI. The questionnaire had two parts and after the chosen respondents had answered the questions, they then took the English Proficiency test to determine their English language proficiency.

Part 1 of the questionnaire had six questions, including demographic question (on gender, weight and height), do they skip breakfast, what is the reason if they skip the breakfast, and what do they feel afterwards in the class when they had skipped breakfast. Respondents had to tick the given options for the questions.

Part 2 of the questionnaire consisted of two simple IQ tests. The first IQ test was about spotting the differences in two pictures within one minute. This test was carried out to test the respondent's focus.

The second IQ test was to study the given symbols thoroughly in one minute, and they had to list down all the symbols they remembered. This test was carried out to test their memory.

The questionnaires were then collected after all the students finished answering. The marks for IQ test from each respondent were totalled up and calculated. The full marks appointed for the IQ test were 15 marks for focus test and 12 marks for memory test, a total of 27 marks. Their marks were converted into percentage and ranked with excellent (100% - 60%), pass (59% - 30%) and fail (29% - 0%). All the results were transformed into bar charts and tables.

Following this, English Language Proficiency test was given to the respondents. A test with two sections of 15 questions was conducted for the students, the time allocated for the test was thirty minutes. This test had Part A and Part B. Part A was Listening which included eight questions. Students listened to CD recording which was played twice. Upon hearing, students had to answer Part A which had to be completed within fifteen minutes. Part B was Reading consisting of seven questions. Students read the passage given and answered questions based on the passage. Each question had four choices. Students had to choose the most appropriate answer. All the questions were based on the given passage. Part B was completed within fifteen minutes. Once students have completed this test, results were tabulated and presented in bar graph form.

Lastly, the BMI was calculated from the height and weight for each respondent obtained from the answered questionnaire.

Data was obtained from 68 subjects of PIDC students. The height and weight were obtained from the given questionnaire and BMI was calculated by using the following formula:

$$\text{BMI} = \text{weight(Kg)} / \text{height}^2(\text{m}^2)$$

Then, the subjects were classified into groups based on the BMI calculation:

1. Less than 16.0 – severely underweight
2. From 16.0 – 18.5 – underweight
3. From 18.6 – 25.0 – normal
4. From 25.1 – 30.0 – overweight
5. From 30.1 – 35.0 – moderately obese
6. More than 35.0 – severely obese

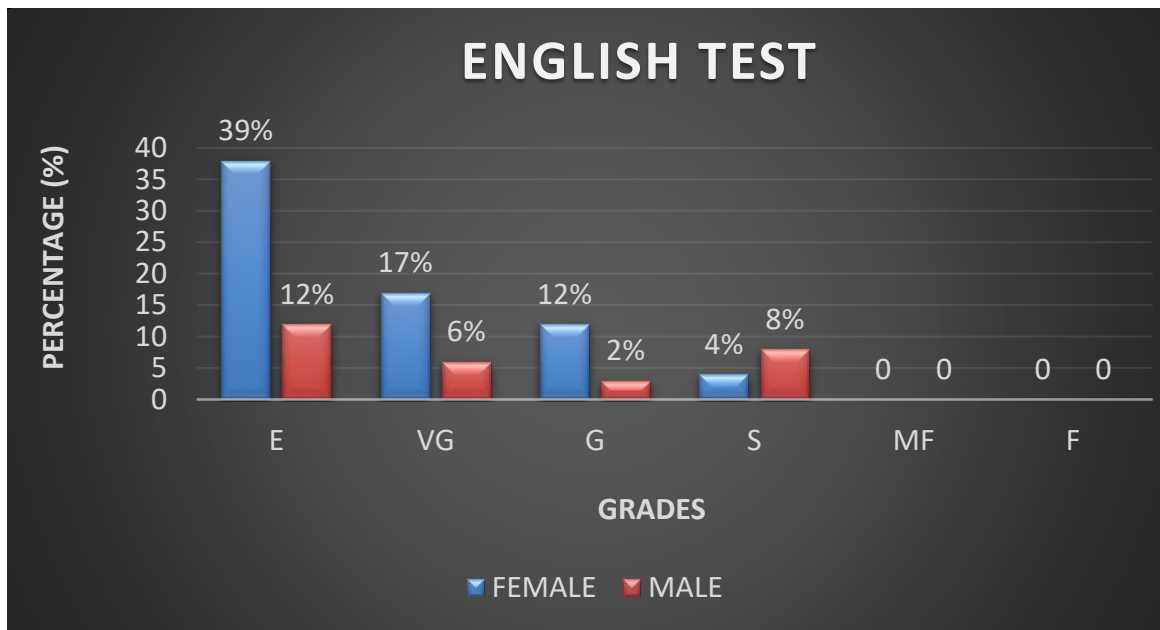
Statistical Analysis

Data was entered into a spreadsheet (Excel 2016, Microsoft) and analysed using the Statistical Package for Social Science (SPSS) for Windows software. The Pearson correlation test was used to determine the relationship between skipping breakfast, BMI and English Language proficiency to undergraduates' academic performance. The level of significance was set at 0.05.

III. Result

ENGLISH LANGUAGE PROFICIENCY , 2 components of Malaysian University English Test MUET (Figure I-Table and Graph)

	PERCENTAGE OF STUDENTS (n=68)	FEMALES (n)	MALES (n)
EXCELLENT	51% (34)	39% (26)	12% (8)
VERY GOOD	23% (16)	17% (12)	6% (4)
GOOD	14% (10)	12% (8)	2% (2)
SATISFACTORY	12% (8)	4% (3)	8% (5)
MARGINAL FAIL	-	-	-
FAIL	-	-	-



E= EXCELLENT

VG= VERY GOOD

G= GOOD

S= SATISFACTORY

MF= MARGINAL FAIL

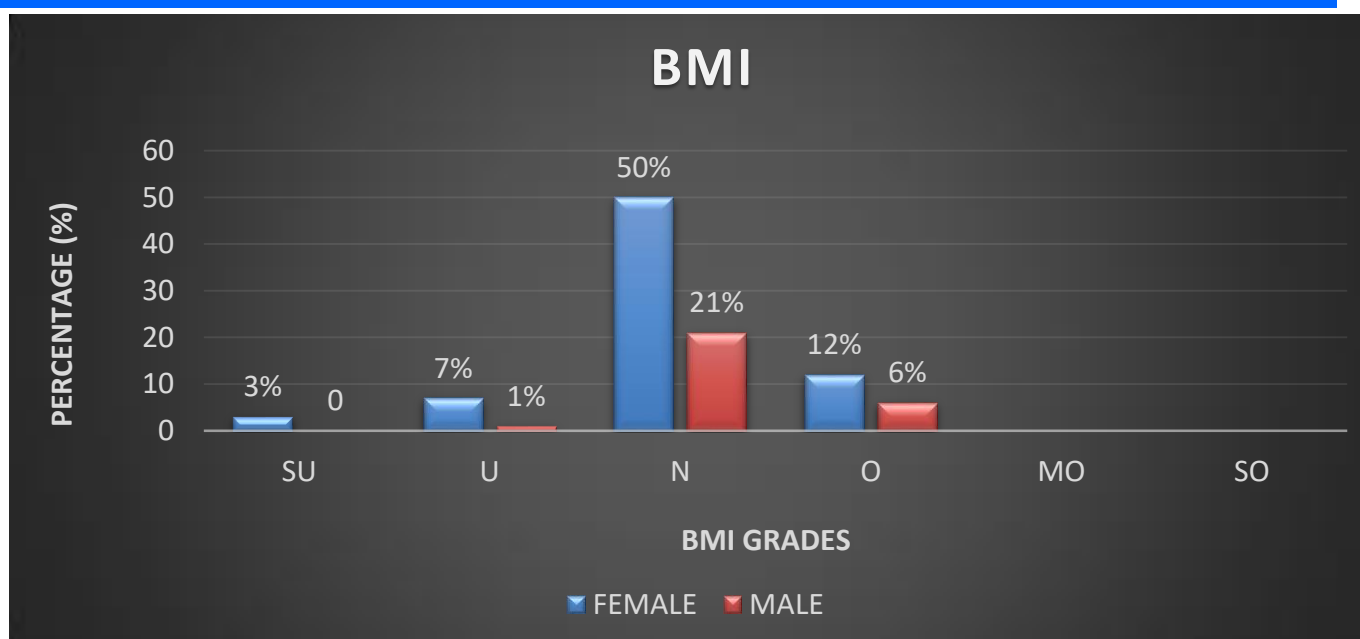
F= FAIL

The excellent category recorded the highest percentage of students corresponding to English test

in which the percentage was 51%, a total of 34 students. The very good category recorded the second highest percentage of 23%, a total of 16 students. On the other hand, the good category recorded the percentage of 14%, a total of 10 students corresponding to English test. In satisfactory category, only 12% of students were recorded, a total of 8 students. (Figure I-Table and Graph)

NUMBER AND PERCENTAGE OF STUDENTS CORRESPONDING TO BODY MASS INDEX (Figure II-Table and Graph)

	PERCENTAGE OF STUDENTS (n=68)	FEMALES (n)	MALES (n)
SEVERELY UNDERWEIGHT	3% (2)	3% (2)	0
UNDERWEIGHT	9% (6)	7% (5)	1% (1)
NORMAL	71% (48)	50% (34)	21% (14)
OBESE	17% (12)	12% (8)	6% (4)
MODERATELY OBESE	-	-	-
SEVERELY OBESE	-	-	-



SU= SEVERELY UNDERWEIGHT

U= UNDERWEIGHT

N=NORMAL

O=OVERWEIGHT

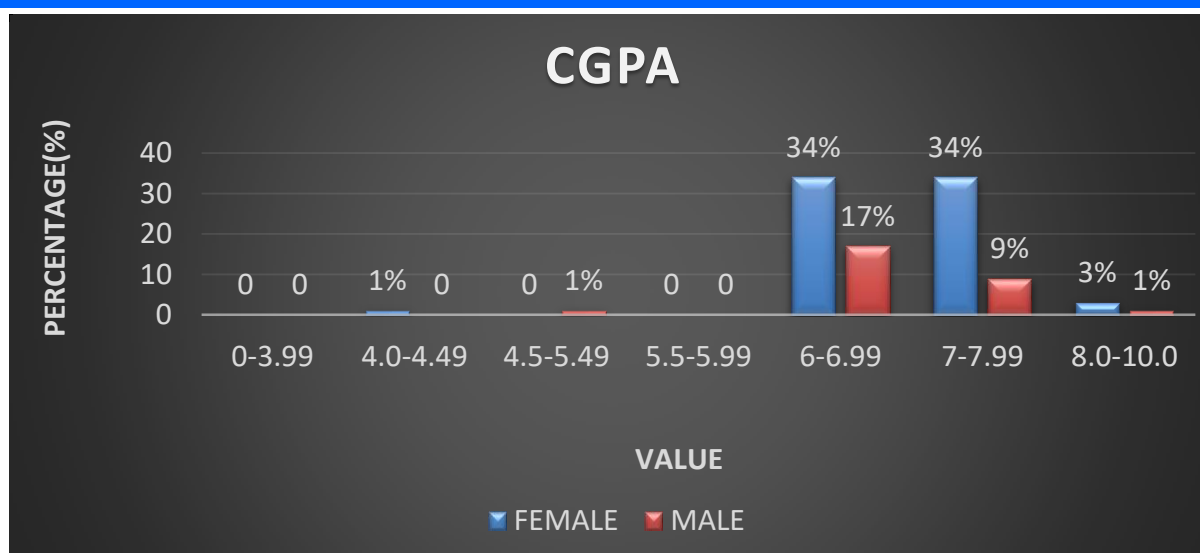
MO=MODERATELY OBESE

SO=SEVERELY OBESE

The normal category of BMI recorded the highest percentage of students that is 70.59%, a total of 48 students. On the other hand, the severely underweight category recorded the lowest percentage of the total population that is 2.94%. (Figure II-Table and Graph)

NUMBER AND PERCENTAGE OF STUDENTS CORRESPONDING TO CGPA (Figure III-Table and Graph)

-	PERCENTAGE OF STUDENTS (n=68)	PERCENTAGE OF FEMALES (n)	PERCENTAGE OF MALES (n)
<u>0 – 3.99</u>	⌘	⌘	⌘
<u>4.0 – 4.49</u>	<u>1% (1)</u>	<u>1% (1)</u>	⌘
<u>4.5 – 5.49</u>	<u>1% (1)</u>	⌘	<u>1% (1)</u>
<u>5.5 – 5.99</u>	⌘	⌘	⌘
<u>6.0 – 6.99</u>	<u>50% (34)</u>	<u>34% (23)</u>	<u>17% (11)</u>
<u>7.0 – 7.99</u>	<u>44% (29)</u>	<u>34% (23)</u>	<u>9% (6)</u>
<u>8.0 – 10.0</u>	<u>4 % (3)</u>	<u>3% (2)</u>	<u>1% (1)</u>

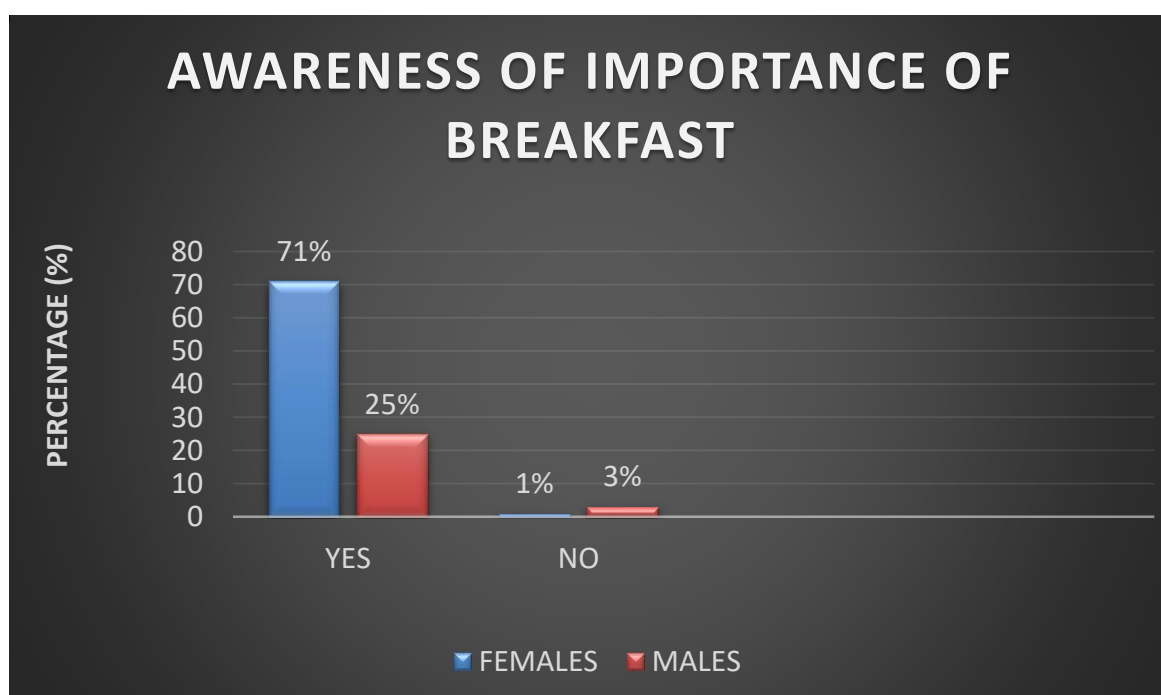


The range of 7.0 – 7.99 according to CGPA recorded the highest percentage of students that is 42.65%, a total of 29 students. On the other hand, the range of 4.0 – 4.49 and 4.5 – 5.49 was recorded by

the lowest percentage of students that is 1.47% each. (Figure III-Table and Graph)

AWARENESS OF IMPORTANCE OF BREAKFAST (Figure IV-Table and Graph)

	TOTAL NO OF STUDENTS (n=68)	FEMALES (n)	MALES(n)
YES	96% (65)	71% (48)	25% (17)
NO	4% (3)	1% (1)	3% (2)

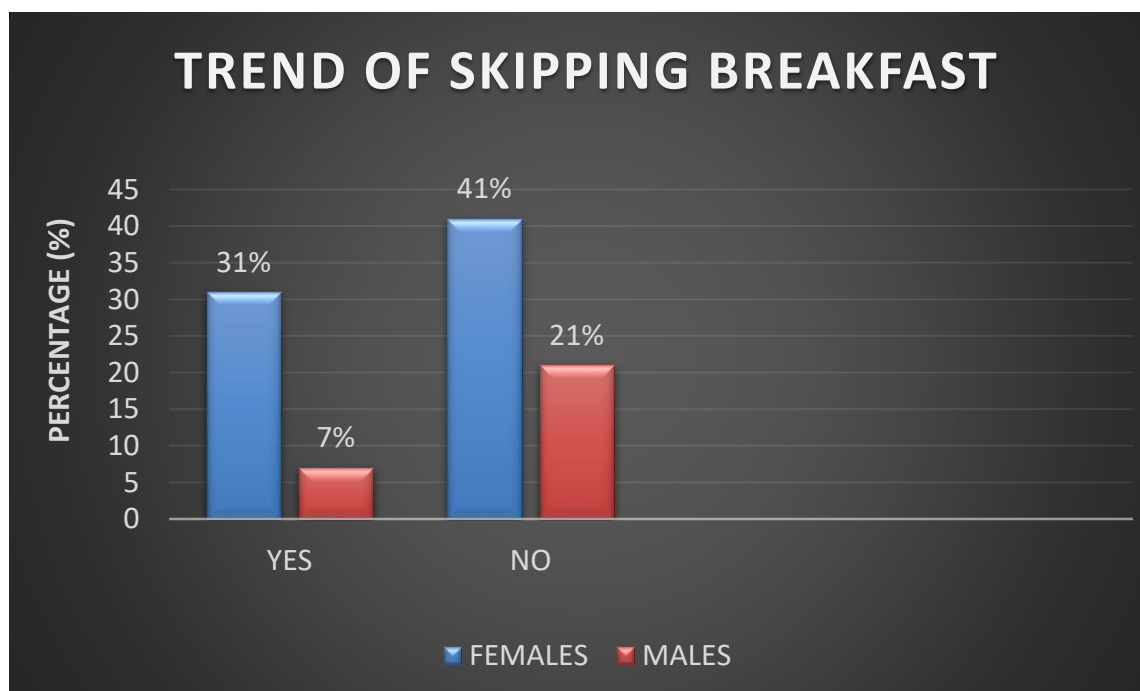


Students who answered yes according to awareness of importance of breakfast were 95.6% with total of 65 students which included 48 females and 17 males. Students who answered no were 4.4%

with only 1 female and 2 males. (Figure IV-Table and Graph)

TREND OF SKIPPING BREAKFAST (Figure V-Table and Graph)

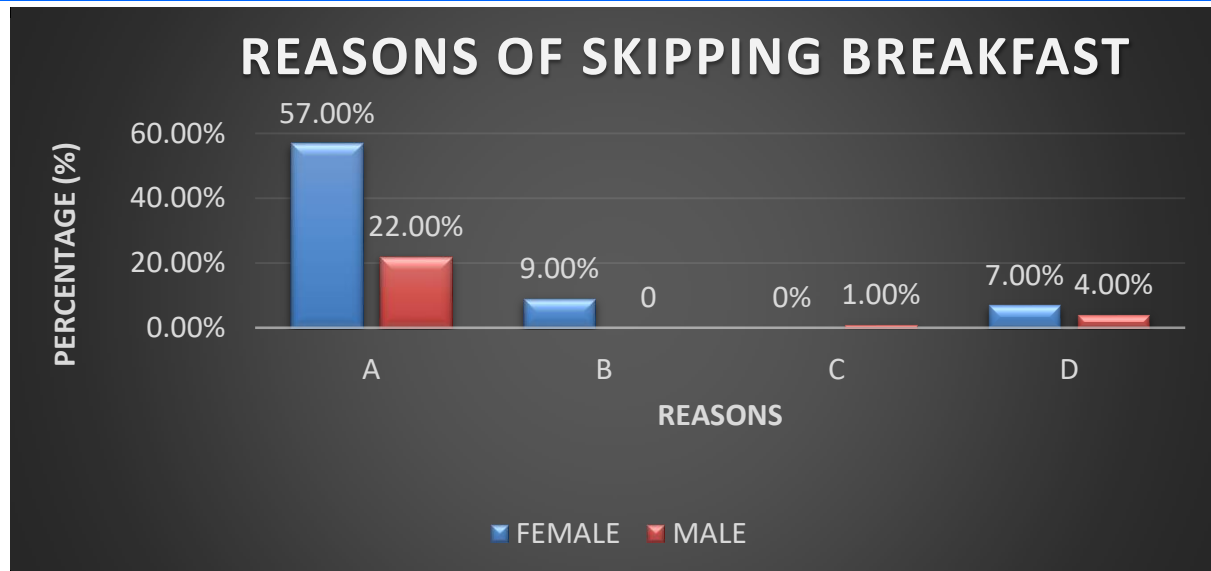
	PERCENTAGE OF STUDENTS (n=68)	FEMALES (n)	MALES(n)
YES	38% (26)	31% (21)	7% (5)
NO	62% (42)	41% (28)	21% (14)



Thus 62% of the students were not skipping breakfast (Figure V-Table and Graph)

REASON OF SKIPPING BREAKFAST (Figure VI-Table and Graph)

	PERCENTAGE OF STUDENTS (n=68)	FEMALES (n)	MALES (n)
A. LACK OF TIME	80% (54)	57% (39)	22% (15)
B. LACK OF APPETITE	9% (6)	9% (6)	0
C. FINANCIAL PROBLEMS	1% (1)	0	1% (1)
D. OTHERS	10% (7)	7% (4)	4% (3)



Reasons:

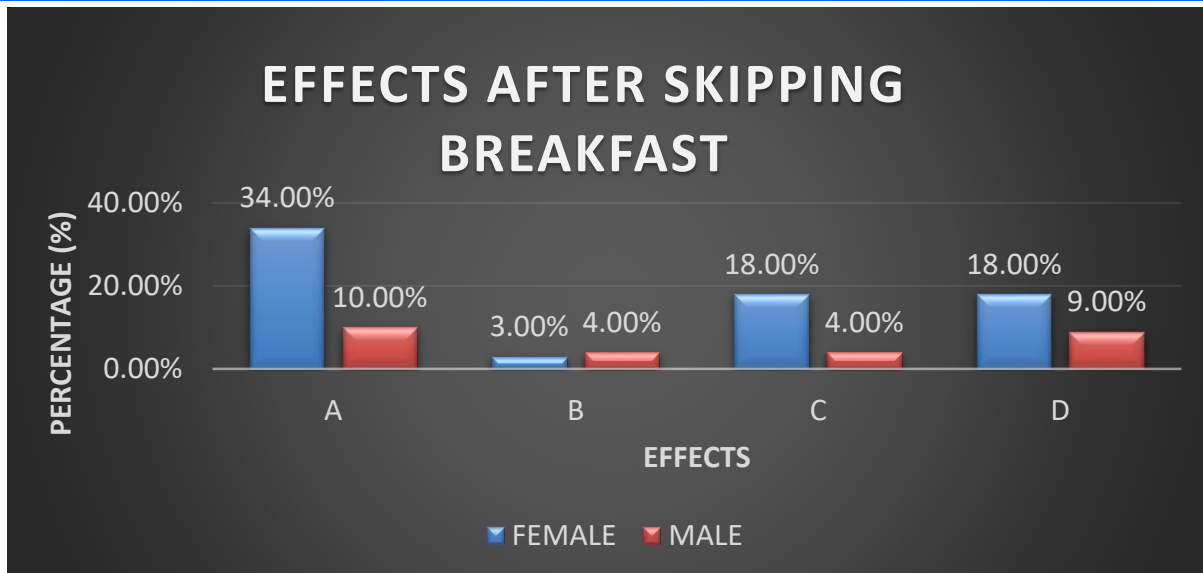
- A) Lack of time
- B) Lack of appetite
- C) Financial problem
- D) Others

Students with the reason of lack of time had the highest percentage of 79.4% which included 39 females and 15 males. Students with the reason of

lack of appetite presented with 8.8% with only 6 females. Students with the reason of financial problem presented with 1.5% with only 1 male involved. Students with the other reason presented with 10.3% which included 4 females and 3 males. (Figure VI-Table and Graph)

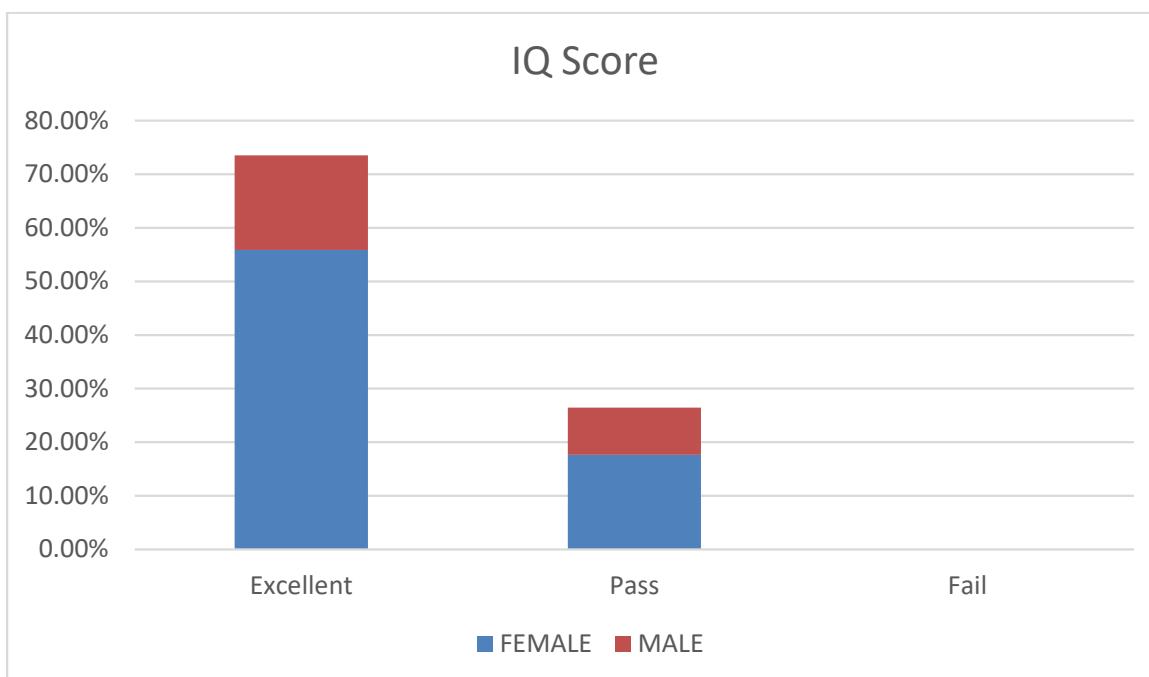
Effects after Skipping Breakfast (Figure VII-Table and Graph)

	PERCENTAGE OF STUDENTS (n=68)	FEMALES (n)	MALES (n)
A. LACK OF FOCUS	44% (30)	34% (23)	10% (7)
B. LACK OF INTEREST	7% (5)	3% (2)	4% (3)
C. SLEEPY	22% (22)	18% (12)	4% (3)
D. OTHERS	27% (18)	18% (12)	9% (6)



Number And Percentage of Students Corresponding To IQ Score (Figure VIII-Table and Graph)

	No. of students	Percentage of students	Percentage of females	Percentage of males
Excellent	50	73.53%	55.88%	17.65%
Pass	18	26.47%	17.65%	8.82%
Fail	0	0%	0%	0%



Excellent category has the highest percentage of 73.5% equivalent to 50 students which included 38 females and 12 males. No student was recorded

under fail category. Under pass category, 26.5% were recorded which included 12 females and 6 males. (Figure VIII-Table and Graph)

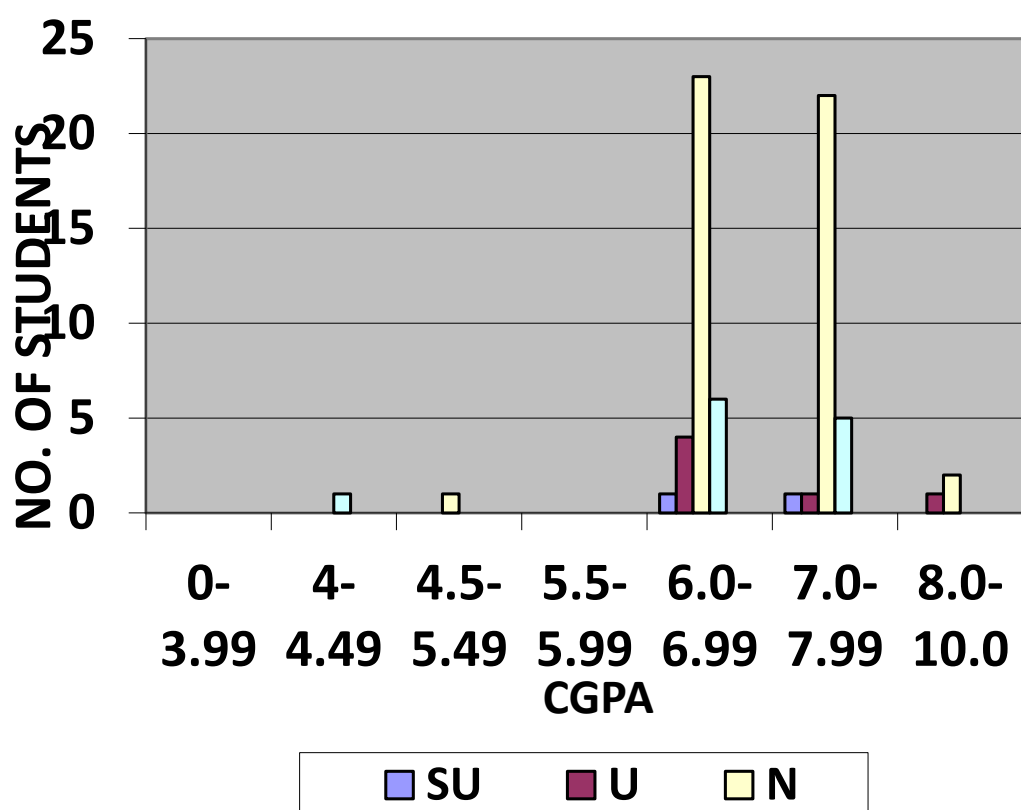
Pearson Correlation and p-values of Variables (Figure IX-Table)

Variables	Pearson Correlation (r-value)	p-value
BMI	0.02	0.8713
English Proficiency	0.42	0.0003
Breakfast Habit	0.35	0.0034

BMI CORRESPONDING TO CGPA (Figure X-Table and Graph)

	SU	U	N	O	MO	O
0-3.99	-	-	-	-	-	-
4-4.49	-	-	-	1	-	-
4.5-5.49	-	-	1	-	-	-
5.5-5.99	-	-	-	-	-	-
6.0-6.99	1	4	23	6	-	-
7.0-7.99	1	1	22	5	-	-
8.0-10.0	-	1	2	-	-	-

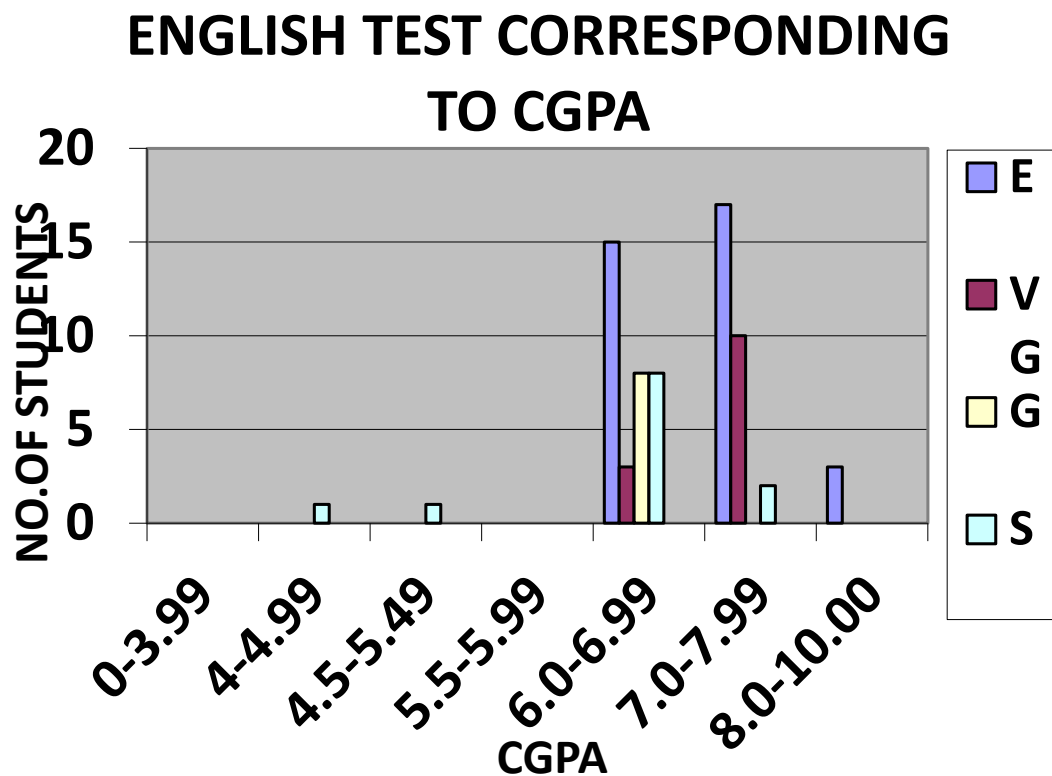
BMI CORRESPONDING TO CGPA



SU= severely underweight
 U= underweight
 N=normal
 O= overweight
 MO= moderately obese
 SO= severely obese
 Normal category in BMI is the highest, with 23 students under CGPA of 6.0-6.99, 22 students under CGPA of 7.0-7.99 and 2 students under CGPA of 8.0-10.0. This was followed by students in overweight category with 1 student under CGPA of 4.4-4.9, 6 students under CGPA of 6.0-6.99 and 5 students under CGPA of 7.0-7.99. By Pearson correlation (r -value=0.02), there was a weak correlation between BMI and CGPA. (Figure X-Table, Figure XI-Table and Graph)

ENGLISH TEST CORRESPONDING TO CGPA (Figure XI-Table and Graph)

	E	VG	G	S	MF	F
0-3.99	-	-	-	-	-	-
4-4.49	-	-	-	1	-	-
4.5-5.49	-	-	-	1	-	-
5.5-5.99	-	-	-	-	-	-
6.0-6.99	15	3	8	8	-	-
7.0-7.99	17	10	-	2	-	-
8.0-10.0	3	-	-	-	-	-



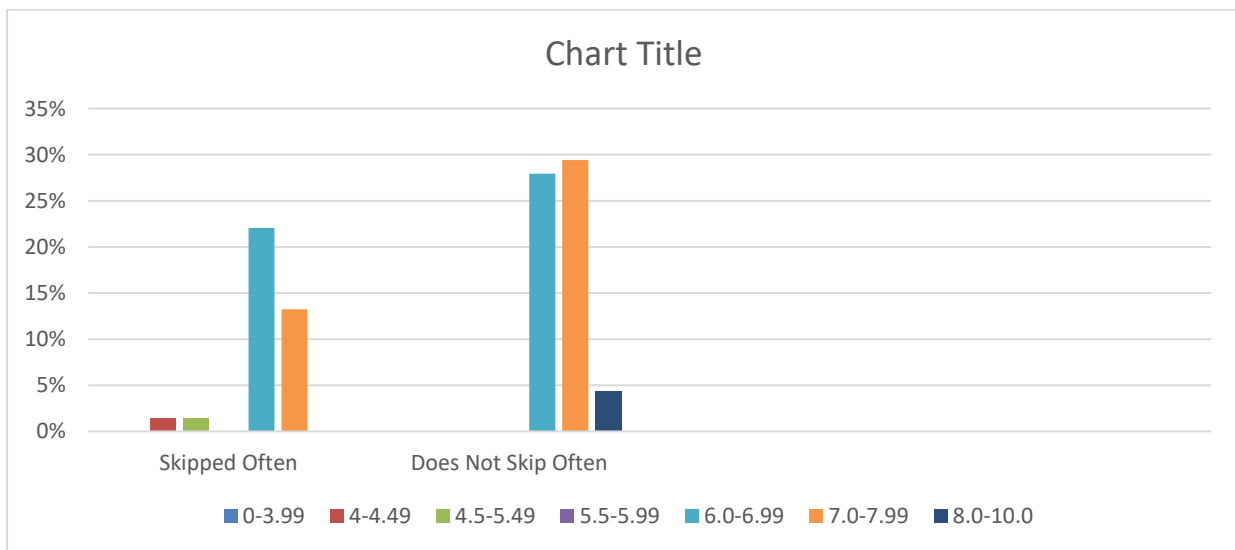
Excellent category in English test showed the highest number of respondents where 3 students fell under CGPA range of 8.0-10.0, 17 students fell under CGPA range of 7.0-7.99, 15 students under CGPA range of 6.0-6.99. For very good category, 10 students fell under CGPA range of 7.0-7.99 and 3 students under range of 6.0-6.99. For good category,

8 students fell under the CGPA range of 6.0-6.99. For CGPA below 4.99, only 2 students with satisfactory English test result were recorded. By Pearson Correlation (r -value=0.42, p -value=0.0003), there was a significant correlation between English proficiency with CGPA (Figure XII-Table and Graph)

No. and Percentage of Students With Breakfast Skipping Habits Corresponding To CGPA (Figure XII-Table and Graph)

	0-3.99		4-4.49		4.5-5.49		5.5-5.99		6-6.99		7-7.99		8.0-10.0	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Skipped Breakfast	0	0	1	1.47	1	1.47	0	0	15	22.06	9	13.24	0	0
Does Not Skip Breakfast	0	0	0	0	0	0	0	0	19	27.94	20	29.41	3	4.41

Breakfast Skipping Habits Corresponding To CGPA



Students who skipped breakfast presented with 15 students who fell under the CGPA range of 6-6.99 and 9 students fell under CGPA range of 7-7.99, 1 student fell under CGPA range of 4-4.49 and 1 student fell under the range of 4.5-5.99. For non-breakfast skippers, 3 students fell under CGPA range of 8.0-10.0, 19 students fell under the range of 6-6.99 and 20 students fell under the range of 7-7.99. By Pearson Correlation (r -value=0.35, p -value=0.0034), there was a significant correlation between breakfast skipping habit and CGPA. (Figure X and Figure XII-Table and Graph)

IV. Discussion

For students' BMI corresponding to CGPA, most students who scored CGPA of 6.0-6.99, 7.0-7.99 and 8.0-10.0 are from the normal category. The lowest CGPA 4.0-4.49 was scored by a student under the category of obese. Students who were underweight and severely underweight scored above CGPA 6.0. According to the R -value= 0.02, there was a weak correlation between BMI and academic performance. This indicated that BMI has little effect on undergraduates' academic performance only. This finding coincided with a recent study done by Alswat (2017) which demonstrated weak correlation between body mass index (BMI) and school academic performance of 424 students from the intermediate and high schools located in Taif city, Kingdom of Saudi Arabia[13]. Another study done by Wehigaldeniya (2017) also came to the same conclusion as our study. The research was conducted on 449 regular students of the Faculty of Social sciences and Humanities, university of Kelaniya concluded that there was no significant relationship between BMI and academic performance[14].

For English test corresponding to CGPA, only students with excellent English proficiency scored the highest CGPA of 8.0-10.0. For CGPA of 6.0-6.99 and 7.0-7.99, more students with excellent English

proficiency were recorded compared to very good, good and satisfactory. The lowest CGPA was scored by a student with satisfactory English language proficiency. According to the R -value= 0.43 (p -value=0.0003 <0.05), there is a significant positive correlation between English proficiency and academic performance. In a study conducted at the State University of New York at Albany, Light (1987) determined a statistically significant positive correlation between TOEFL scores and grade point averages (GPAs) among 376 international graduate students ($r = .14$, $p = <.05$). Similar results were reported by Johnson (1988), who conducted a confirmatory study at the University of Wisconsin - Green Bay among 196 international undergraduate students[15,16]. However, a study done by Graham (1987) showed that there was no significant correlation between English language proficiency and academic performance[17].

For breakfast skipping habit corresponding to CGPA, the highest CGPA of 8.0-10.0 was scored by non-breakfast skippers only. CGPA of 6.0-6.99 were scored mostly by non-breakfast skippers compared to breakfast skippers. Similarly, CGPA of 7.0-7.99 was scored mostly by non-breakfast skippers as well. The lowest CGPA of 4.0-4.49 was scored by a breakfast skipper. This showed that students who took breakfast tend to score better CGPA. According to the R -value= 0.35 (p -value=0.0034 <0.05), there is a significant positive correlation between breakfast habit and academic performance. This finding indicated that non-breakfast skipper tend to have better academic performance. A study done by Ludin (2016) among second year undergraduates of Faculty of Health Sciences, Universiti Kebangsaan Malaysia shared the same finding that there was a positive correlation between breakfast habit and academic performance of undergraduates[18]. Another study done by Taha (2017) on the effect of breakfast on academic performance among high school students in Abu

Dhabi had the similar finding[19]. However, a study done by Lovino (2016) found that breakfast consumption had no short-term effect on neuropsychological functioning in healthy school-aged children. The administered neuropsychological tests included measures of attention, impulsivity, short-term memory, cognitive processing speed, and verbal learning which have direct impact on academic performance[20].

According to the number of students corresponding to English Test, most students scored excellent followed by satisfactory, very good and lastly, good. No student has scored marginal fail or fail. This indicated that most third year and fourth year students in PIDC have good English language proficiency. However, in a study done by Musa NC (2012) showed that there was a strong influence of the national language or Bahasa Malaysia over the learning of English among Malaysian learners[21]. This may cause an impact on the proficiency of English language in general among Malaysian students.

According to number of students corresponding to Body Mass Index, most students were in the average category. On the other hand, the severely underweight category of lowest BMI recorded the least number of students. Obese category had the second highest number of students followed by underweight and severely underweight. This showed that majority of PIDC students in year three and four have healthy physiques compared to underweight and obese categories. A study done by Adeyemi (2014) showed that majority of respondents comprised of Malaysia primary school children were within the average BMI category as well[22].

According to number of students corresponding to CGPA, the range of 7.0 – 7.99 recorded the highest number of students corresponding to CGPA. On the other hand, the range of 4.0 – 4.49 and 4.5 – 5.49 recorded the lowest number of students corresponding to CGPA. In the range of 4.0 – 4.49 and 4.5 – 5.49, there is only 1 female and 1 male respectively. No student has scored between the range 0-3.99 and 5.5-5.99. From this finding, it showed that most undergraduates of PIDC are high achievers in academic performance. In a study conducted by involving a total of 460 second-year electrical engineering students from Universiti Teknologi Malaysia also showed that a majority of respondents being high academic achievers[23].

According to how often students skipped their breakfast, less answered 'yes' which included 17 females and 12 males. More student answered 'no' which included 32 females and 7 males. Within the male category, most students tend to skip their breakfast whereas in the female category, the result showed otherwise. According to awareness of importance of breakfast, most students were aware of the importance of the meal. Despite the high number of respondents being aware of the importance of breakfast, there were still a handful of them skipping

their breakfast due to reasons such as lack of time, appetite, financial problem or other. In a study done by Yun (2010), the rate of breakfast skipping (frequency of eating breakfast under 4 times/week) was 41.20%, nearly half of the total subjects involving 1148 Korean adults.

According to reason of skipping breakfast, most students answered 'lack of time' as the reason they skipped breakfast. This was followed by 'other reason', 'lack of appetite' and lastly, 'financial problem'. Only one student had answered 'financial problem' as the reason he skipped breakfast. Lack of time could be an effect of early class schedule causing students to skip their breakfast inevitably. Yun (2010) also found that that the main reason for breakfast skipping was "lack of time for the preparation and consumption of food" as well among those Korean adults[24].

According to effect after skipping breakfast, most students answered 'lack of focus' as the commonest effect followed by 'others', 'sleepy' and lastly 'lack of interest'. Lack of focus may cause the efficacy in learning to drop tremendously among students and thus, lead to poorer academic performance. In a study done by Lien (2007), it was found that adolescents who took breakfast seldom/never were associated with being mentally distressed compared to those who took breakfast regularly[25].

According to number of students corresponding to IQ test, most scored excellent followed by pass. No student has failed in the test. This showed that most students in Penang International Dental College have good memory and focus skills. A study done by Lovino (2016) found that breakfast consumption had no short-term effect on neuropsychological functioning in healthy school-aged children. The administered neuropsychological tests included measures of attention, impulsivity, short-term memory, cognitive processing speed, and verbal learning[20].

V. Conclusion

The study was conducted to investigate the relation between skipping breakfast, BMI and English language proficiency on academic performance. From the results obtained, there were significant correlations between breakfast habit and English language proficiency to academic performance of undergraduates in PIDC. However, the study showed a non-significant correlation between BMI to academic performance. Since the p-value is less than our chosen significance alpha value = 0.05, we rejected the null hypothesis and concluded that academic performance is dependent on breakfast habit and English Language proficiency in undergraduates of Penang International Dental College.

We would like to emphasize on the importance of promoting and implementing strategies that focus on breakfast intake and English language proficiency in students including primary and secondary school youths as academic performance should be enhanced

since young age. Nutritional health programs and English book fairs can be carried out in those schools in order to achieve this.

VI. Acknowledgment

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