



ISSN Print: 2394-7500
 ISSN Online: 2394-5869
 Impact Factor: 5.2
 IJAR 2018; 4(3): 442-447
 www.allresearchjournal.com
 Received: 07-01-2018
 Accepted: 10-02-2018

S. Lakshmi Priya
 Department of Statistics,
 Annamalai University, Tamil
 Nadu, India

R. Jayaseelan
 Department of Statistics,
 Annamalai University, Tamil
 Nadu, India

R Chinnapen
 Department of Statistics,
 Annamalai University, Tamil
 Nadu, India

S Saranya
 Department of Statistics,
 Annamalai University, Tamil
 Nadu, India

A statistical analysis on BMI with stress level of college students in Puducherry

S Lakshmi Priya, R Jayaseelan, R Chinnapen and S Saranya

Abstract

This paper undergone with primary data collection. The questionnaire was filled by the college students in puducherry in the academic year 2015. Two stage Stratified random sampling is used as the sampling technique. In the first stage of sampling, the population is divided into three strata. (i) Arts & science college students (ii) Engineering college students (iii) Medical college students. In the second stage of sampling, colleges has been stratified based on the type of institution (government or private). The strata are (i) Government college students & (ii) Private college students. Then one college from Arts & science colleges, one college from engineering colleges and one college from Medical colleges are randomly selected. Thus selected colleges for collecting the samples are Indra Gandhi college of arts and science (Arts & science-Government), Saradha Gangadharan college (Arts & science-Private), Pondicherry engineering college (Engineering-Government), Manakula Vinayagar institute of technology (Engineering-Private), JIPMER (Medical-Government) and Mahatma Gandhi college of medical sciences (Medical-Private). This paper focused on "The Body mass index with stress level of college students in Pondicherry". Based on this sampling technique, 250 samples were collected and statistical analysis was carried out.

Keywords: Mental stress, physical stress, graphical representation, independent t-test and chi-square test

1. Introduction

In this paper the focus lies on BMI level of college students with respect to their stress level among various type of college institutions in Pondicherry. Both over- and underweight is a major problem and extremely unhealthy. Underweight may cause additionally problems as a weak immune system and a higher risk of life-threatening situation when infected with certain diseases because they patients don't have any fat reserves. It's important to look at the reasons for under- and overweight. In most cases overweight people are able to lose a lot of weight, if they eat less but more healthy food and do more sport. To gain more weight, the people have to eat more, regular and healthy food. But food and especially healthy food that should contain a lot of proteins is expensive.

1.1 Body Mass Index: BMI is a measurement which determines which weight category a person belongs to. The weight status categories opposite, are those currently used by the Centers for Disease Control and Prevention (CDC). They are suitable for adults who have stopped growing.

For children and teens that are still growing, the CDC base the weight categories on a BMI percentile. A child's weight status is based on where their BMI value lies compared to children of a similar age.

1.2 BMI Weight Categories

Depending on the height and weight, a person can belong to one of the following weight categories:

Table 1

| BMI | Weight Status |
|-------------|---------------|
| Below 18.5 | Underweight |
| 18.5 - 24.9 | Normal |
| 25 - 29.9 | Overweight |
| 30.0 + | Obese |

Correspondence
S. Lakshmi Priya
 Department of Statistics,
 Annamalai University, Tamil
 Nadu, India

The formula for BMI was developed by Belgium Statistician Adolphe Quetelet approximately 150 years ago. This was before the era of electronic calculators; any formula used to indicate weight status needed to be easy for physicians to manually calculate. Only the height and weight values of a person are needed in the equation.

1.3 Calculation of BMI

The metric formula accepts height measurements in meters and weight in kilograms. If you know your height in centimeters only, simply divide the number of centimeters by 100 convert it to meters.

For example, a person who is 183cms tall is 1.83m tall (183cm / 100 = 1.83m).

Using the metric formula is even easier than the imperial method as it's a two-step process

1. Multiply your height by itself.
2. Divide your weight in kilograms by the value calculated in step 1.

The resulting number is your BMI. Compare this BMI value with the weight status table below.

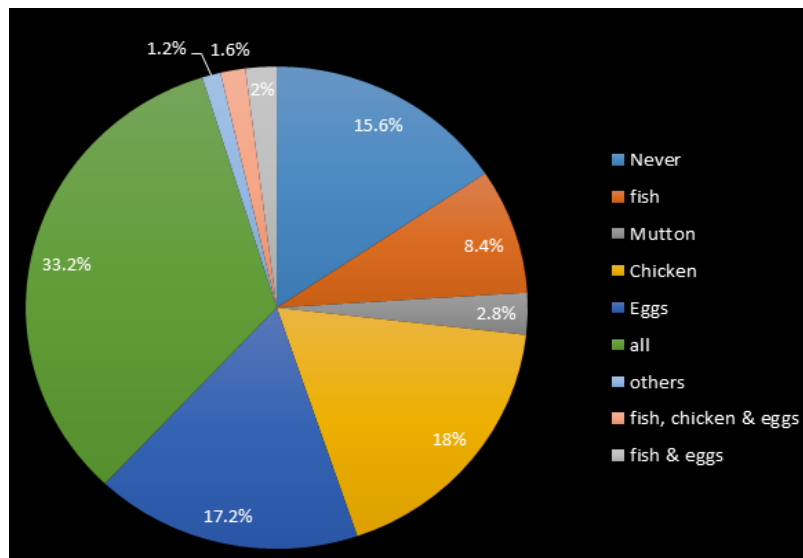
1.4 Limitations of the BMI Formula

1. There's no question that the body mass index calculation has been useful for some physicians.
2. However, since its creation many have stated that this method of calculating BMI is not fit for purpose.
3. BMI does not take into account other factors which may affect a person's height or weight:
4. Body builders and athletes with a high proportion of muscle mass.
5. The elderly (whose height and muscle mass may fall over time), frail people, and those affected by certain illnesses.
6. Lactating or pregnant women.
7. Children and teenagers who have not reached physical maturity and are still growing.
8. A tendency for natural differences in height and weight ratios between races

2. Analysis Part

2.1 Graphical representation

2.1.1 Type of Non-Veg food mostly eaten

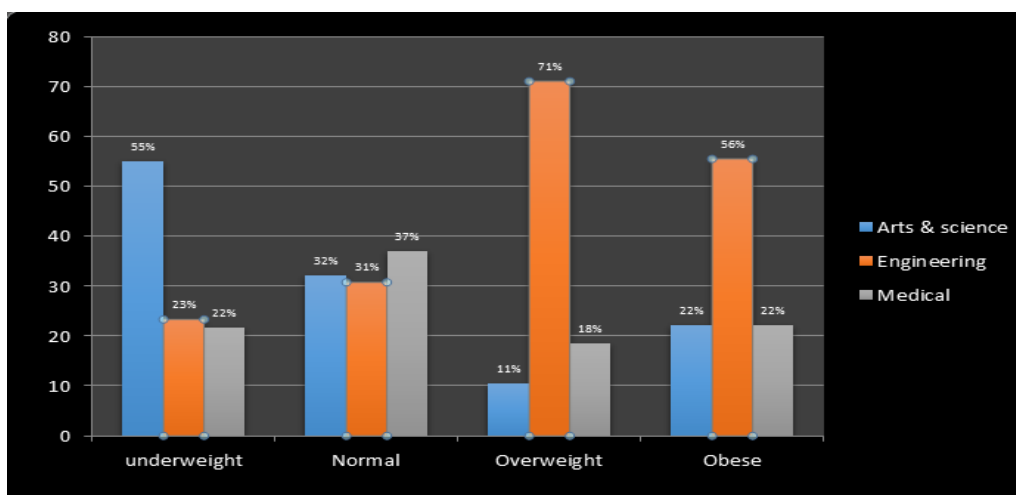


From the above pie diagram, it is observed that 33.2% of students used to eat almost all type of non-veg food. 18% of students mostly prefers to eat Chicken. 17.2% of students mostly prefers to eat Eggs. 8.4% of the students mostly prefers to eat fish. 2.8% of students mostly prefers to eat mutton. 2% of the students mostly prefers to eat fish &

Eggs. 1.2% of the students mostly prefers to eat others such as prawns.

2.1.2 Multiple bar diagram

BMI range type of college

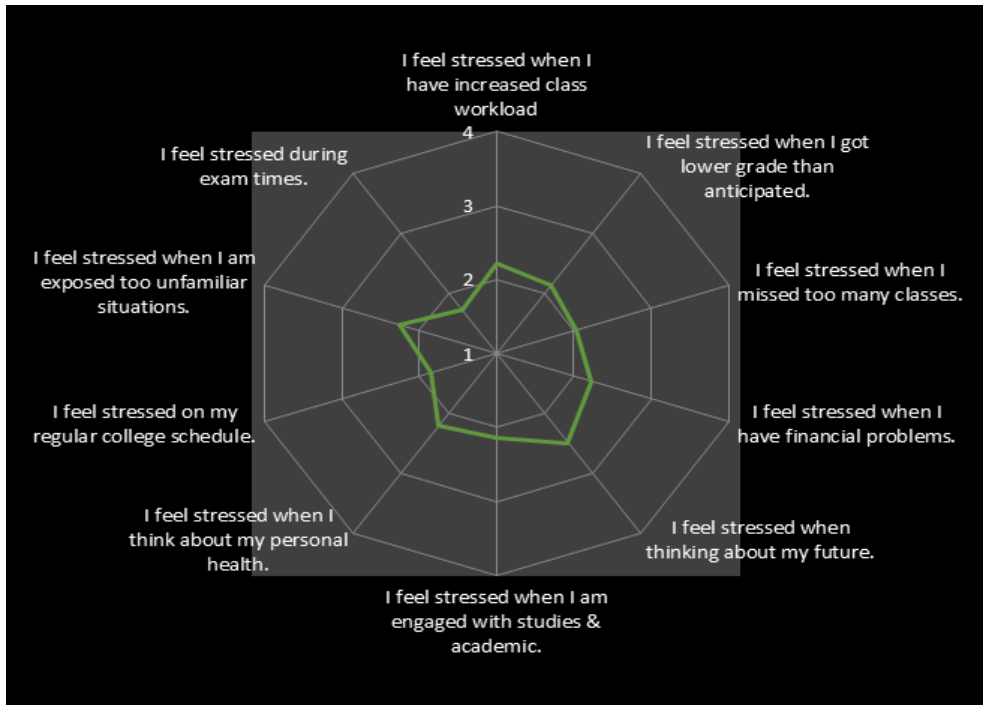


From the above multiple bar diagram, it is observed that 55% of the students from Arts & science, 23% of the students from Engineering and 22% of the students from Medical institutes are Underweight. 32% of the students from Arts & science, 31% of the students from Engineering and 37% of the students from Medical institutes are Normal. 11% of the students from Arts & science, 71% of the students from Engineering and 18% of the students from

Medical institutes are Overweight. 22% of the students from Arts & science, 56% of the students from Engineering and 22% of the students from Medical institutes are Obese.

2.1.3 Radar Graph

2.1.3.1 Mental stress among the college students who belongs to Government College



From the above diagram 3.1.3.1, it is observed that Mental stress among the college students who belongs to government college occurs rarely or sometimes. And it is also observed that the students are more stressed when

thinking about future.

2.1.3.2 Physical stress among the college students who belongs to Government College



From the above diagram 3.1.3.2, it is observed that Physical stress among the college students who belongs to Government College occurs never or rarely.

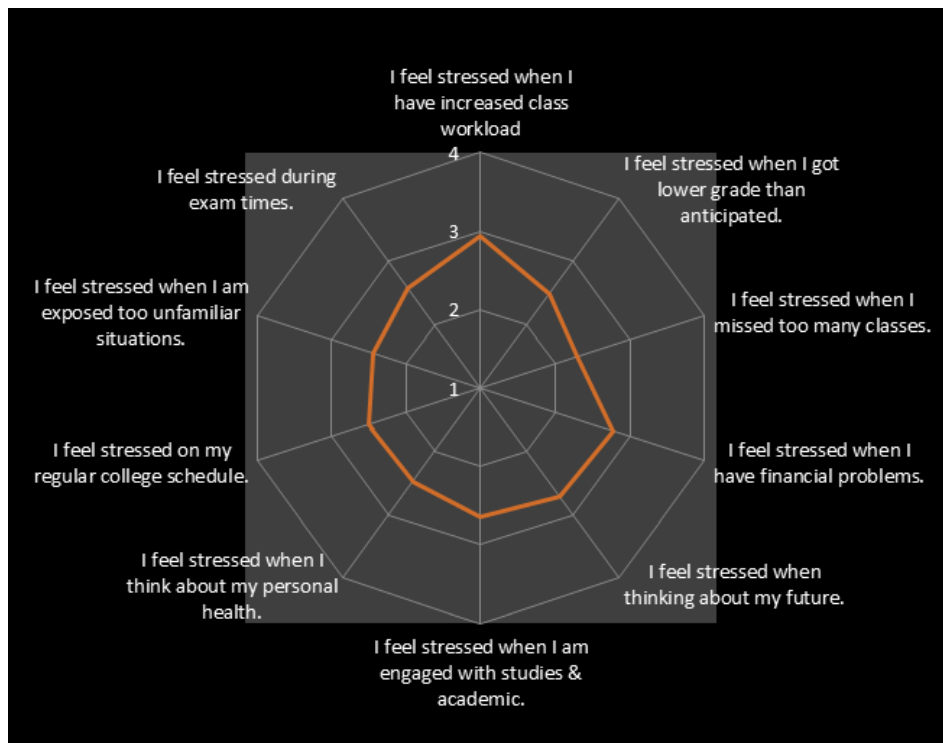
2.1.3.3 Physical stress among the college students who belongs to Private College



Independent Samples Test

From the above diagram 3.1.3.3, it is observed that mental stress among the college students who belongs to private college occurs rarely or sometimes.

2.1.3.4 Mental stress among the college students who belongs to Private College



From the above diagram 3.1.3.4, it is observed that Mental stress among the college students who belongs to private college occurs rarely or sometimes. And it is also observed

that the students are more stressed when having increased workload.

3. Independent t-test

AIM: To test whether there is any difference in BMI level based on diet type.

Hypothesis

H₀: There is no difference in BMI level based on diet type.
H₁: There is difference in BMI level based on diet type.

Table 2: Group Statistics

| | Diet | N | Mean | Std. Deviation | Std. Error Mean |
|-----|----------------|-----|-----------|----------------|-----------------|
| BMI | Vegetarian | 39 | 22.058012 | 4.4506729 | .7126780 |
| | non vegetarian | 211 | 21.779276 | 4.2052061 | .2894983 |

Table 3: Independent samples test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | |
|-----|-----------------------------|---|------|------------------------------|--------|-----------------|-----------------|-----------------------|
| | | F | Sig. | T | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference |
| BMI | Equal variances assumed | .046 | .830 | .377 | 248 | .707 | .2787357 | .7396822 |
| | Equal variances not assumed | | | .362 | 51.322 | .719 | .2787357 | .7692329 |

Since the p-value is greater than 0.05, we accept null hypothesis at 5% level of significance. Hence we conclude that there is no difference in BMI level based on diet type.

Chi-Square Test

AIM: To test whether there is any association between BMI range and the type of institutions

Hypothesis

H₀: There is no association between BMI range and the type of institutions
H₁: There is association between BMI range and the type of institution

Crosstabs

Table 4: BMI range: Type of college 2 Cross Tabulation

| | | Type of college 2 | | | Total |
|----------|-------------|-------------------|-------------|---------|-------|
| | | Arts & science | Engineering | Medical | |
| BMIrange | Underweight | 33 | 14 | 13 | 60 |
| | Normal | 46 | 44 | 53 | 143 |
| | Overweight | 4 | 27 | 7 | 38 |
| | Obese | 2 | 5 | 2 | 9 |
| Total | | 85 | 90 | 75 | 250 |

From the above table we infer that among the Arts & Science students, 33 students are underweight, 46 students are Normal, 4 Students are Overweight and 2 students are Obese. Among Engineering students, 14 students are underweight, 44 students are Normal, 27 Students are Overweight and 5 students are Obese. Among Medical students, 13students are underweight, 53 students are Normal, 7 Students are Overweight and 2 students are Obese.

Table 4: Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 37.782 ^a | 6 | .000 |
| Likelihood Ratio | 36.584 | 6 | .000 |
| Linear-by-Linear Association | 6.077 | 1 | .014 |
| N of Valid Cases | 250 | | |

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is 2.70.

Since the p-value for Pearson chi-square is less than 0.05, we reject H₀ at 5% level of significance. Hence we conclude that there is association between BMI range and type of institutions.

4.1 Chi-Square Test

AIM: To check whether there is any association between BMI range and type of college1 (Government or Private)

Hypothesis: H₀: There is no association between BMI range and type of college1 (Government or Private)
H₁: There is association between BMI range and type of college1 (Government or Private)

Table 5: BMI range * Type of college1 Cross Tabulation

| | | type of college1 | | Total |
|----------|-------------|------------------|---------|-------|
| | | Government | Private | |
| BMIrange | Underweight | 32 | 28 | 60 |
| | Normal | 85 | 58 | 143 |
| | Overweight | 27 | 11 | 38 |
| | Obese | 5 | 4 | 9 |
| Total | | 149 | 101 | 250 |

From the above table we infer that 32 & 28 students belongs to Government & Private Institutes respectively are Underweight.85 & 58 students belongs to Government & Private Institutes respectively are Normal. 27 & 11 students belongs to Government & Private Institutes respectively are Overweight. 5 & 4 students belongs to Government & Private Institutes respectively are Obese.

Table 6: Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 3.111 ^a | 3 | .375 |
| Likelihood Ratio | 3.185 | 3 | .364 |
| Linear-by-Linear Association | 1.684 | 1 | .194 |
| N of Valid Cases | 250 | | |

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is 2.70.

Since the p-value for Pearson chi-square is greater than 0.05, we accept H₀ at 5% level of significance. Hence we conclude that there is no association between BMI range and type of college1 (govt. or private).

Conclusions

The Body mass index is a tool to indicate the nutritional state of adults that is commonly used to classify underweight, overweight and obesity of adults. If is not in normal, that may tend to different diseases. The various

results obtained from this study are summarized as 71% of the overweight students are observed from Engineering colleges and 56% of the students are obese from Engineering colleges. So there is a risk factor among engineering college students to expose to obesity. The BMI range, "Underweight" is observed more among Arts & Science college students and 55% students from Arts and Science colleges are underweight and 15.6% of the college students in Pondicherry are following vegetarian diet whereas 84.4% are following non-vegetarian diets. Among the students who follows non-vegetarian diets, 33.2% use to eat all kind of non-vegetarian foods.

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