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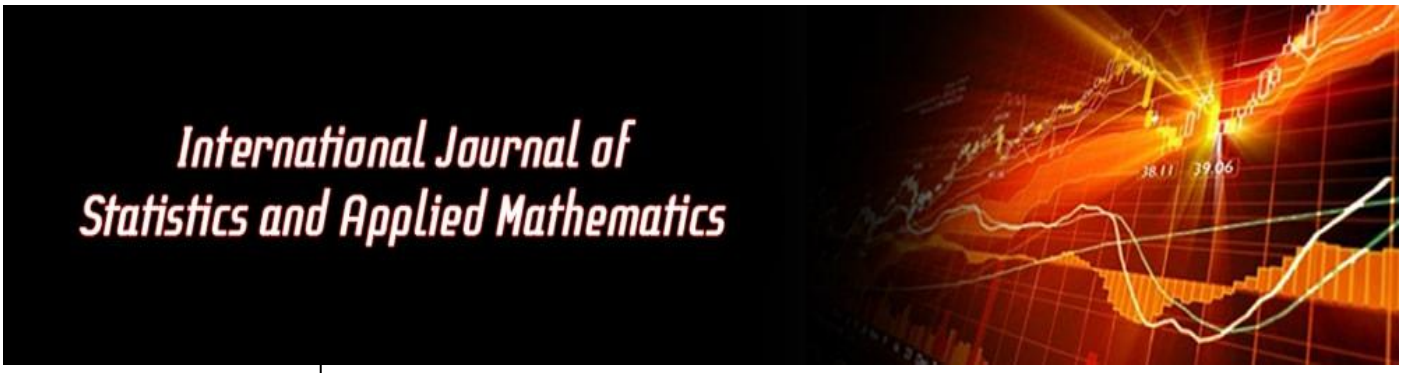

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A statistical study on BMI of stress level among college students in Puducherry

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Abstract
This paper focused on "The Body mass index with stress level of college students in Pondicherry". 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. In the second stage of sampling, colleges has been stratified based on the type of institution (government or private). Some colleges are selected randomly among all colleges for collecting the samples based on the sampling technique, 250 samples were collected and statistical analysis was carried out.

Keywords: One-way ANOVA, correlation, multiple linear regression and factor analysis

Introduction
The BMI level of college students with respect to their stress level among various type of college institutions in Pondicherry were collected as samples and some statistical analysis tools were applied to focus on the following objectives:

- To find the type of Non-Vegetarian food mostly eaten by the college students.
- To classify the students based on BMI range from different type of institutions (Arts & Science, Engineering, and Medical).
- To find the average stress level among the college students based on the type of institution (Governmentor Private)
- To test whether there is any difference in BMI level based on diet type.
- To test whether there is any association between BMI range and the type of institutions (Arts & Science, Engineering and Medical)
- To test whether there is any association between stress level and the type of institutions (Arts & Science, Engineering and Medical)
- To check whether there is any association between BMI range and type of college1 (Government or Private).
- To check whether there is any correlation between the weight & time spent for computer.
- To find the factors influencing the Body Mass Index of the college students.

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

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

The formula for BMI was developed by Belgium Statistician AdolpheQuetelet 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.

3. Analysis Part

3.1 One-way ANOVA

Aim

To test whether there is any difference in BMI among the type of institutions

Hypothesis

H_0: There is no difference in BMI among the type of institutions

H_1: There is difference in BMI among the type of institutions

Table 1: ANOVA

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	596.157	2	298.078	19.011	.000
Within Groups	3872.712	247	15.679		
Total	4468.869	249			

Since the p-value (0.000) is less than 0.05, we reject null hypothesis at 5% level of significance. So we conclude that there is difference in BMI among the type of institutions.

Table 2: Post Hoc Tests

(I) type of college2	(J) type of college2	Mean Difference (I-J)	Std. Error	Sig.
Arts & science	Engineering	-3.6925930*	.5988905	.000
	Medical	-1.8550033*	.6273054	.010
Engineering	Arts & science	3.6925930*	.5988905	.000
	Medical	1.8375897*	.6190835	.009
Medical	Arts & science	1.8550033*	.6273054	.010
	Engineering	-1.8375897*	.6190835	.009

From the above Multiple comparisons table, it is observed that all the p-values are less than 0.05, we reject H_0 at 5% level of significance. Hence we conclude that the difference occurs between all types of institutions.

3.2 correlation

Aim

To check whether there is any correlation between the weight & time spent for computer.

Hypothesis

H_0: There is no correlation between the weight & time spent for computer.

H_1: There is correlation between the weight & time spent for computer.

Table 3: Correlations

		Computer	weight
Computer	Pearson Correlation	1	.356**
	Sig. (2-tailed)		.000
	N	250	250
Weight	Pearson Correlation	.356**	1
	Sig. (2-tailed)	.000	
	N	250	250

**. Correlation is significant at the 0.01 level (2-tailed).

From the above correlation table, it is observed that p-value is less than 0.05, So we reject H_0 at 5% level of significance. Hence we conclude that there is correlation between the weight & time spent for computer. Also it is observed that weight & time spent for computer are 35.6% positively correlated.

3.3 Multiple regression

Aim

To find the factors influencing the Body Mass Index of the college students.

Regression

Table 4: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.659[a]	.435	.273	2.0508453

a. Predictors: (Constant), outside food, computer, ff restaurant, phystress, study, tv, Exercise, carbonated drinks, games, mentalstress

From the above table, it is observed that R square is 0.435, which implies that 43.5% of the variation in the BMI values is explained by explanatory variables.

Table 5: ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	113.182	10	11.318	2.691	.015[a]
	Residual	147.209	35	4.206		
	Total	260.391	45			

a. Predictors: (Constant), outside food, computer, ff restaurant, phystress, study, tv, Exercise, carbonated drinks, games, mentalstress
b. Dependent Variable: bmi

Since the p-value (0.015) is less than 0.05 from the table 3.7.2, we reject H_0 at 5% level of significance. Hence we conclude that some of the factors influencing the BMI values.

Table 6: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	24.482	2.142		11.427	.000
	tv	.039	.025	.238	1.542	.132
	computer	-.023	.024	-.135	-.963	.342
	Exercise	.024	.043	.082	.551	.585
	games	-.025	.045	-.095	-.562	.578
	study	.030	.029	.158	1.038	.306
	phystress	-.002	.494	-.001	-.004	.997
	mentalstress	-.328	.790	-.103	-.415	.681
	fastfood restaurant	1.635	.506	.501	3.232	.003
	carbonated drinks	-.502	.399	-.200	-1.258	.217
	outside food	.494	.211	.359	2.346	.025

a. Dependent Variable: bmi

From the above table, it is observed that major factors which influences the BMI values are eating at fast-food restaurants (0.501), eating outside foods (.359), time spent for tv (.238), consumption of carbonated drinks (.20), &time spent for computer (.135).

3.4 Factor Analysis

Aim

To conduct factor Analysis on the data related to stress

Table 7: Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Workload	2.51	1.089	247
lower grade	2.27	1.084	247
missed too classes	2.14	1.055	247
financial problems	2.45	1.050	247
thinking about future	2.57	1.180	247
Studies & academic	2.36	1.026	247
personal health	2.31	1.026	247
regular college schedule	2.13	1.028	247
unfamiliar situation	2.32	1.044	247
eating habits	1.86	.992	247
exam times	2.49	1.154	247
headache without reason	1.90	1.074	247
Tired	1.92	1.041	247
lose of apetite	1.66	.957	247
Dizzy	1.63	.919	247
Sweating	1.50	.845	247
Breathless	1.47	.785	247
Crying	1.85	1.011	247
impotent	2.15	1.080	247
awake during sleep	1.98	1.049	247

From the above Descriptive Statistics table, we can see that Workload (i.e.) "I feel stressed when I have increased class workload" and Thinking about future (i.e.) "I feel stressed when thinking about my future" have the highest ranking of 2.51 and 2.57 respectively. The criteria Sweating (i.e.) I feel sweating without reason and Breathless (i.e.) I feel breathless without reason have the least scores of 1.50 and 1.47 respectively.

Table 8: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.862
Bartlett's Test of Sphericity	Approx. Chi-Square	1524.414
	Df	190
	Sig.	.000

From above KMO and Bartlett's test table, KMO measure of sampling adequacy is found to be 0.862. So the given sample is representative enough to give valid results. The Bartlett's test of sphericity is rejected to conclude that the sphericity assumption is violated.

Table 9: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.085	30.425	30.425	6.085	30.425	30.425	3.726	18.628	18.628
2	2.114	10.570	40.995	2.114	10.570	40.995	2.838	14.189	32.817
3	1.198	5.991	46.986	1.198	5.991	46.986	2.834	14.169	46.986
4	.997	4.987	51.974						
5	.955	4.774	56.748						
6	.929	4.643	61.391						
7	.809	4.045	65.436						
8	.805	4.025	69.461						
9	.744	3.722	73.183						
10	.666	3.328	76.511						
11	.611	3.053	79.564						
12	.601	3.005	82.568						
13	.582	2.910	85.478						
14	.519	2.597	88.075						
15	.489	2.443	90.518						
16	.479	2.395	92.913						
17	.446	2.228	95.142						
18	.373	1.864	97.006						
19	.336	1.680	98.686						
20	.263	1.314	100.000						

Extraction Method: Principal Component Analysis.

From the above Total variance explained table, it is clear that the variation is 46.986%.

Fig 1

The Scree plot depicts the presence of 3 Principal components with eigen values greater than one.

Table 10: Rotated Component Matrix[a]

	Component		
	1	2	3
Workload		.640	.415
lower grade		.693	
missed too classes		.690	
financial problems		.302	.576
thinking about future		.393	.624
studies&academic			.712
personal health			.563
regular college schedule	.380		.608
unfamiliar situation		.655	
eating habits	.306		.584
exam times		.563	.359
headache without reason	.540		
Tired	.650		
lose of appetite	.652		
Dizzy	.712		
Sweating	.575		
Breathless	.667		
Crying	.567		
impotent	.407	.363	
awake during sleep	.666		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

From the above"Rotated Component Matrix" table, we observe that each questions belongs to one of the 3 components.

Table 11: Communalities

	Initial	Extraction
Workload	1.000	.588
lower grade	1.000	.523
missed too classes	1.000	.516
financial problems	1.000	.437
thinking about future	1.000	.548
studies&academic	1.000	.557
personal health	1.000	.402
regular college schedule	1.000	.514
unfamiliar situation	1.000	.481
eating habits	1.000	.435
exam times	1.000	.457
headache without reason well	1.000	.382
Tired	1.000	.494
lose of appetite	1.000	.449
Dizzy	1.000	.532
Sweating	1.000	.354
Breathless	1.000	.516
Crying	1.000	.413
impotent	1.000	.322
awake during sleep	1.000	.476

Extraction Method: Principal Component Analysis.

From the above Communalities table indicates that the extraction communalities are high which means that the extracted component represents the variability well.

4. Conclusions

From the results of statistical analysis, 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. Mental stress is more among college students than physical stress. Major causes of obesity is due to eating at fast food restaurants and eating outside foods. More time spends for Computer tends to gain weight of 35% 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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