

Original Research Article

A cross sectional study of dietary patterns and the association of perceived stress on body mass index among undergraduate medical students including compulsory residential rotatory interns

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ABSTRACT

Background: Medical education proves to be a tough and stressful environment during which these young physicians-in-training gain large amounts of knowledge and skills. Previous studies regarding dietary habits, body mass index (BMI) and perceived stress failed to include Compulsory Residential Rotatory Interns (CRRIs). This study encompassing medical undergraduate students of all years including CRRIs aims to identify dietary patterns and significant associations between dietary habits, Perceived Stress and BMI.

Methods: Cross-sectional study conducted with sample size of 150 consisting of undergraduate medical students varying from the first year to CRRIs at SRM Medical College, Hospital and Research Centre, Tamil Nadu. Dietary habits noted with an information schedule. BMI calculated using Quetelet's index. Cohen's PSS-10 questionnaire provided to quantify Perceived Stress. Associations tested using Chi-square test and Correlation.

Results: Prevalence of obesity -7% and overweight -26.7% with males having higher mean BMI. Majority at 52% perceived 'moderate' stress with males having higher mean PSS score. Awareness of balanced diet was 94.7% with 32% practicing balanced diet. Diet frequency was regular in 62% and 49.3% was skipping meals. 92.7% consumed junk food often and 13.3% partook in binge eating. 8% participated in crash diets and significant association found between this dietary factor and BMI. Significant correlation and positive linear relationship found between Perceived Stress and BMI.

Conclusions: Higher levels of perceived stress among students including CRRIs lead to overall higher values of BMI indicates the need for stricter healthier dietary habits and psychological health services to relieve stress.

Keywords: BMI, Perceived stress, Medical undergraduate students

INTRODUCTION

Medical undergraduate students including CRRIs (compulsory residential rotatory intern) are subject to high levels of stress due to various factors such as academic, health related and psychosocial stressors as perceived by the students.¹⁻³ Under various stressful conditions, these students develop unhealthy dietary habits and patterns leading to an overall poor lifestyle.⁴

Some unhealthy practices of eating habits include consumption of under nutritious food like junk food, skipping meals, irregularity in meal timings.⁵ Although the behaviour of the student is subject to change as they are considered to be temporary, it usually tends to persist in adult life post student status.⁶ This could be extremely detrimental to the health of the student. Non communicable diseases such as hypertension, diabetes mellitus, myocardial infarction are on the increase

because of the cumulative effect of poor dietary habits, stress and lifestyle throughout the life of the individual. These diseases could be easily avoided by changing dietary habits and lifestyle in the early formative years thus preventing economic and social burden especially since these physicians in training are the future care givers.

There appears to be a lack of inclusion of CRRIs in previous studies pertaining to the dietary habits and application to daily practice among medical college students. Similarly, studies regarding the perceived stress on undergraduate medical students again fail to include CRRIs. Studies demonstrating the association of dietary patterns to BMI have been conducted but is lacking in its association with perceived stress. Hence this study was undertaken to attempt to study the dietary patterns, BMI (body mass index) and Perceived Stress in addition to finding any significant correlation between BMI and Perceived Stress among medical undergraduate students inclusive of CRRIs.

Objectives

- To study the dietary habits, BMI and Perceived Stress among undergraduate medical students including CRRIs (18 to 23 years).
- To identify any significant association between the dietary habits and BMI, dietary habits and Perceived Stress, and significant correlation between Perceived Stress and Body Mass Index.

METHODS

Study design

This is a descriptive cross-sectional study that will be carried out in the Department of Community Medicine, SRM Medical College, Hospital and Research Centre, Kattankulathur, Tamil Nadu. The study was carried out over the period of five months from September 2015 to January 2016.

Participants

The study population is comprised of a sample size of 150 subjects. The study population consists of SRM undergraduate medical students varying from the first year to CRRI (18 to 23 years). The subjects were chosen at random without any bias. Informed consent was obtained from the study population.

Questionnaire

The students were provided with an information schedule with their demographic information namely; their sex (male/female), age and which academic year of MBBS they are currently in. The schedule also consisted of information pertaining to the dietary habits namely; diet type (vegetarian/non vegetarian), awareness regarding

balanced diet(yes/no/don't know), practice of balanced diet(yes/no/don't know), consumption of junk food (often/rarely), diet frequency (regular/irregular), practice of skipping meals (nil/atleast 2-3 times a week), binge eating(yes/no) and practicing crash diet (yes/never).

To quantify the perceived stress they were also provided with a 10 item questionnaire of the Perceived Stress Scale (PSS-10) developed by Cohen et al which has proved to be reliable in a sample of college students.^{7,8,9} It has become one of the more popular means of calculating perceived stress in a non invasive format for psychosomatic health research.¹⁰ Cortisol which is a biological indicator of stress was shown to be associated with higher PSS score.¹¹ Upon completion of PSS-10, the perceived stress score was calculated and noted. The answers to the 10 item questionnaire were graded on a 5 point Likert Scale ranging from never (0), almost never (1), sometimes (2), fairly often (3) and very often (4). The positively framed questions which are question number 4, 5, 7 and 8 were scored in reverse meaning the score of never was (4), sometimes was (3), fairly often was (2) and very often was (1). The scores were then totaled and ranging from 0 to 40 with higher scores indicating higher perceived stress. In accordance with a study on perceived stress performed in Bangalore by Thangaraj et al the levels of perceived stress was arbitrarily divided into; mild perceived stress 0-13, moderate perceived stress 14-26 and high perceived stress 27-40.¹²

Method of collection of data

After completing both the questionnaires, the student's height and weight were measured by the investigator. Weight was measured using a standard spring balance weighing machine in kilogram. Height was measured in standing position by stadiometer to the closest 0.1cm. BMI was then calculated using Quetelet's index and classified based on WHO classification (underweight: <18.50, normal: 18.50-24.99, overweight: ≥25.00 and obese: ≥30.00).¹³

Statistical analysis

The data was compiled and analyzed using IBM Statistical Package for Social Sciences (SPSS) statistics. The association was determined by employing Chi Square test where P value less than 0.05 was considered to be statistically significant. The association between BMI and Stress was determined by Correlation using Pearson's coefficient.

RESULTS

A total of 150 subjects were included in the final analysis. Among the total 150 subjects, the distribution according to the academic year of medical education is as follows; First year students was 14%, Second year students was 21.3%, Third year students was 14.7%,

Fourth year students was 24.7% and CRRIs was 25.3%. The mean age of the study population was 20.84 with standard deviation of 1.78. The percentage of the female

students was 43.3% and the male students was 56.7% and the distribution of male and female students in each academic year is displayed as shown in Table 1.

Table 1: Distribution of male and female students in each academic year.

		Gender		Total
		Female	Male	
Academic Year	CRI	17	21	38
	First year	8	13	21
	Fourth year	14	23	37
	Second year	13	19	32
	Third year	13	9	22
Total		65	85	150

Table 2: Distribution of study population in BMI class according to academic year.

		BMI Class				Total
		Normal	Obese	Overweight	Underweight	
Academic Year	CRI	23	3	11	1	38
	First year	12	2	5	2	21
	Fourth year	22	3	10	2	37
	Second year	23	1	7	1	32
	Third year	13	2	7	0	22
Total		93	11	40	6	150

Table 3: Distribution of study population in the PSS score classes according to academic year.

		PSS			Total
		High	Mild	Moderate	
Academic Year	CRI	10	8	20	38
	First year	3	8	10	21
	Fourth year	9	8	20	37
	Second year	5	12	15	32
	Third year	4	5	13	22
Total		31	41	78	150

Table 4: Testing significance between dietary habits and BMI using Chi square test.

Dietary habits	BMI				Significance (p value)
	Normal	Overweight	Obese	Underweight	
Diet type					
Vegetarian	37	10	2	2	Not significant P value= 0.225
Non-Vegetarian	56	30	9	4	
Awareness of balanced diet					
Yes	92	35	10	5	Not significant P value=0.004
No	1	4	1	0	
Don't know	0	1	0	1	
Practice of balanced diet					
Yes	32	10	4	2	Not significant P value=0.33
No	61	29	7	3	
Don't know	0	1	0	1	
Consumption of junk food					
Often	85	39	9	6	Not significant P value=0.264
Rarely	8	1	2	0	
Diet frequency					
Irregular	32	20	4	1	Not significant P value= 0.248
Regular	61	20	7	5	

Continued.

Dietary habits	BMI				Significance (p value)
	Normal	Overweight	Obese	Underweight	
Skipping of meals					
Yes atleast 2-3 times/week	43	23	7	1	Not significant P value=0.180
Nil	50	17	4	5	
Partaking in binge eating					
Yes atleast 1-2 times/week	10	8	2	0	Not significant P value= 0.359
Nil	83	32	9	6	
Participation in crash diets					
Yes	3	2	5	2	Significant P value=0.000
Never	90	38	6	4	

*Tests of Significance done by Chi Square Test. P<0.001 is significant.

Table 5: Tests of significance between dietary habits and perceived stress scale score using Chi square test.

Dietary habits	PSS score			Significance (p value)
	High	Moderate	Mild	
Diet type				
Vegetarian	8	25	18	Not significant P value= 0.240
Non-vegetarian	23	53	23	
Awareness of balanced diet				
Yes	30	74	38	Not significant P value=0.485
No	1	2	3	
Don't know	0	2	0	
Practice of balanced diet				
Yes	10	27	11	Not significant P value= 0.593
No	21	49	30	
Don't know	0	2	0	
Consumption of junk food				
Often	30	71	38	Not significant P value=0.583
Rarely	1	7	3	
Diet frequency				
Irregular	12	29	16	Not significant P value= 0.977
Regular	19	49	25	
Skipping of meals				
Yes atleast 2-3 times/week	17	36	21	Not significant P value=0.687
Nil	14	42	20	
Partaking in binge eating				
Yes atleast 1-2 times/week	6	10	4	Not significant P value= 0.486
Nil	25	68	37	
Participation in crash diets				
Yes	2	10	0	Not significant P value=0.047
Never	29	68	41	

*Tests of Significance done by Chi Square Test. P value<0.001 is significant.

The frequencies of the dietary habits were found to be:

- Awareness of balanced diet: Majority at 94.7% has awareness of balanced diet with only 4% not having awareness and the remaining 1.3% answered with 'don't know'.
- Practice of balanced diet: Majority at 66.7% did not practice balanced diet with 32% following a balanced diet and the remaining 1.3% answered with 'don't know'.
- Diet frequency: Majority was 'Regular' at 62% with the remaining 38% was 'Irregular'.
- Skipping of meals: Majority didn't skip meals at 50.7% closely followed by the remaining 49.3% who skipped meals atleast 2-3 times/week.
- Diet type: Majority consumed a Non-Vegetarian diet at 66% and the remaining 34% consumed a Vegetarian diet.
- Consumption of junk food: An overwhelming majority at 92.7% consumed junk food 'Often' while a 7.3% 'Rarely' consumed junk food.

- Partaking in binge eating: Majority at 86.7% never partook in binge eating Nil- 86.7% while 13.3% did atleast 1-2 times/week.
- Participation in crash diets: Majority at 92% never participated in crash diets with the remaining 8% having participated in crash dieting.

The mean BMI of the total study population is 24.22 with standard deviation of 3.86. The mean BMI in the male population was 24.32 with standard deviation of 3.93 and mean BMI in female population was 24.09 with standard deviation of 3.79. The percentage of the study population that was Normal 62%, Overweight 26.7%, Obese 7.3% and Underweight 4%. In the male population, the prevalence of BMI class Normal was 62.4%, Overweight was 28.2%, Obese was 7.1% and Underweight was 2.3%. In the female population, the prevalence of BMI class Normal was 61.5%, Overweight 24.6%, Obese 7.7% and Underweight 6.2%. The distribution of study population in each BMI class in the respective academic year is as shown in Table 2.

The mean perceived stress scale (PSS) score of the total study population was 20.08 with standard deviation of 7.72. In the male population, the mean perceived stress

score was 20.08 with standard deviation of 7.80. In the female population, the mean perceived stress score was 20.07 with standard deviation of 7.67. The percentage of study population with perceived stress scale (PSS) score in high category is 20.7%, moderate is 52% and mild is 27.3%. In male population, the prevalence of perceived stress in the three arbitrary classes is as follows; high – 22.4%, Moderate – 49.4% and Mild - 28.2%. In the female population, the prevalence of Perceived stress in the three arbitrary classes is as follows; High – 18.4%, Moderate – 55.4% and Mild – 26.2%. The distribution of study population in each PSS class according to the academic year is as shown in Table 3.

The association between the dietary habits and body mass index was tested by running Chi Square test with the results as displayed in Table 4. The only significant association was found to be between ‘participation in crash diet’ and body mass index with a $p < 0.001$. The remaining dietary factors were not found to have significant association with body mass index. The association between dietary habits and perceived stress was tested by running Chi Square test with the results displayed in Table 5. There was found to be no significant association between the dietary factors and perceived stress with all p values > 0.001 .

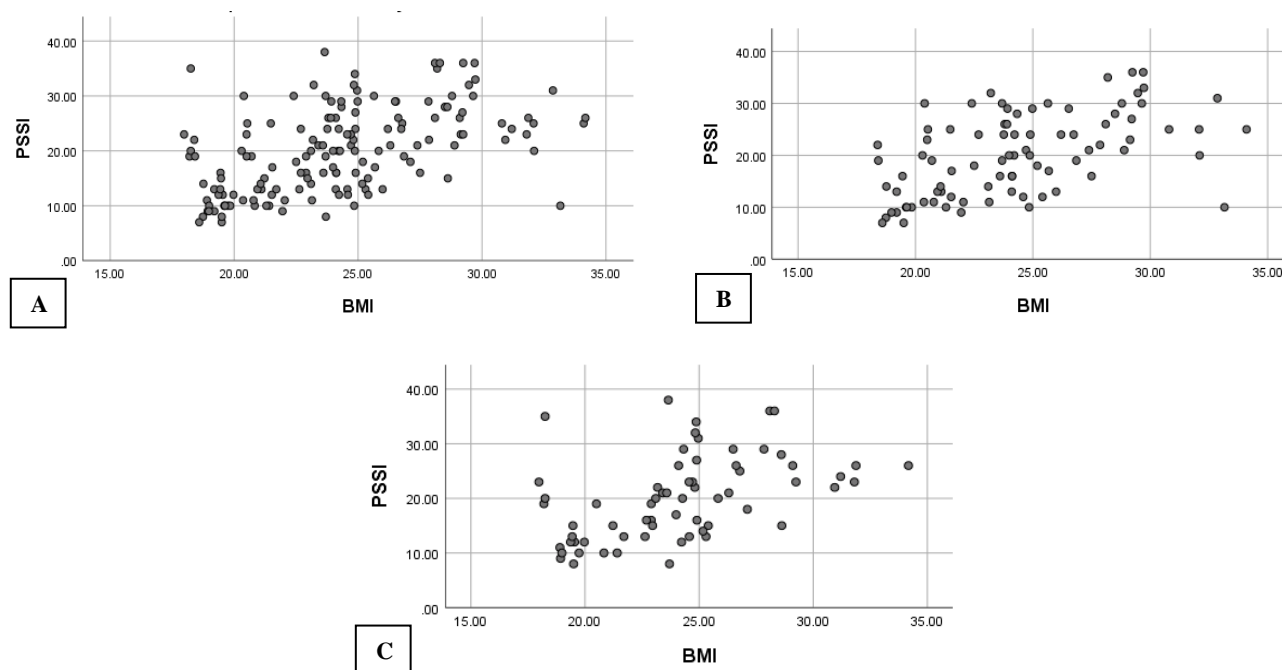


Figure 1: Scatter dot graphs of perceived stress scale (PSS) score by body mass index (A) in the total study population, (B) in male study population, (C) in female study population.

The association between perceived stress and body mass index was calculated by Correlation using Pearson's coefficient. In the total study population, the correlation is significant at $r=0.510$ and p value at 0.000 which is < 0.001 for a two-tailed test. Hence concluding that

statistically the significance is a linear relationship ($p < 0.001$) and the direction of the relationship is positive as indicated in the scatter dot graph (Figure 1). In male study population, the correlation using Pearson's coefficient is significant at $r=0.536$ and p value at 0.000

which is <0.001 for a two-tailed test. Hence concluding that statistically the significance is a linear relationship ($p<0.001$) and the direction of the relationship is positive as indicated in the scatter dot graph (Figure 1). In female study population, the correlation using Pearson's coefficient is significant at $r=0.475$ and p value 0.000 which is <0.001 for a two-tailed test. Hence concluding that statistically the significance is a linear relationship ($p<0.001$) and the direction of the relationship is positive as indicated in the scatter dot graph (Figure 1).

DISCUSSION

Among the total 150 subjects, the distribution according to the academic year of medical education is as follows; First year students was 14%, Second year students was 21.3%, Third year students was 14.7%, Fourth year students was 24.7% and CRRIs was 25.3%. The mean age of the study population was 20.84 with standard deviation of 1.78. In the total study population of 150 the number of female subjects was 65 (43.3%) and number of male subjects was 85 (56.7%). The mean age of the study population was 20.84 with standard deviation of 1.78.

The overall prevalence of obesity is 7.3%, prevalence of overweight is 26.7%, prevalence of underweight is 4% and prevalence of normal is 62%. In the male population, the prevalence of BMI class Normal was 62.4%, Overweight was 28.2%, Obese was 7.1% and Underweight was 2.3%. In the female population, the prevalence of BMI class Normal was 61.5%, Overweight 24.6%, Obese 7.7% and Underweight 6.2%. It appears that in this study the prevalence of Obesity and Overweight appears to be greater when compared to Gupta et al where the overall prevalence of obesity was 3.4% and overweight was 17.5% and Chhabra et al where the prevalence of obesity was 2% and overweight was 11.7% but the prevalence of Underweight appears to be lesser when compared to Kumar et al where the prevalence of underweight was 20.1%. The overall mean BMI is 24.22 with standard deviation of 3.86.¹⁴⁻¹⁶ The mean BMI in the male population was 24.32 with standard deviation of 3.93 and mean BMI in female population was 24.09 with standard deviation of 3.79. The mean BMI in males was higher than the mean BMI of females. The overall mean was found to be higher than the findings by Kumar et al and the finding by Sakamaki et al (where the mean was 20.6 with standard deviation of 2.2).^{16,17}

The overall prevalence of Perceived Stress Scale (PSS) Score in the three arbitrary classes were as follows; mild perceived stress (0-13 score) is 27.3%, moderate perceived stress (14-26 score) is 52% and high perceived stress (27-40 score) is 20.7%. In male population, the prevalence of perceived stress in the three arbitrary classes is as follows; High – 22.4%, Moderate – 49.4% and Mild - 28.2%. In the female population, the prevalence of perceived stress in the three arbitrary classes are as follows; High – 18.4%, Moderate – 55.4%

and Mild – 26.2%. The mean perceived stress score of the total study population was 20.08 with standard deviation of 7.72. In the male population, the mean perceived stress scale score was 20.08 with standard deviation of 7.80. In the female population the mean perceived stress scale score was 20.07 with standard deviation of 7.67. The mean perceived stress scale score appears to be lesser than with the findings of Swaminathan et al where the mean score was 21.09 though in this study the study population though this study included only first year medical students.² The mean perceived stress score is in accordance with the findings of Al-Dubai et al where the mean perceived stress scale score was 20.4 in medical residents in Malaysia.¹⁸ A higher mean PSS score of 30.84 among first and second year students was reported by Shah et al in Pakistan.¹⁹ It was also reported that female students had a higher mean PSS score than the male students by Shah et al whereas here we find that male students have a higher mean PSS score.¹⁹

The awareness of balanced diet among the study population was found to be 94.7% with only 32% practicing balanced diet which is similar to the findings of Saranya et al with a reported awareness of 97% and less than 50% practice of balanced diet.⁵ 34% of the study population was vegetarian and the remaining 66% was non-vegetarian. The diet frequency was found to be regular in 62% of the study population with the remaining 38% with irregular frequency. The students who skipped meals atleast 2-3 times/week was 49.3% and those who didn't was 50.7% similar to the studies by Kumar et al.¹⁶ The consumption of junk food 'often' was 92.7% which is considerably higher than the 63% reported by Silliman et al, the 73% by Kumar et al and the 25.6% by Kutty et al.^{6,16,20} Partaking in binge eating at least 1-2 times/week was 13.3% and participation in crash diets was 8%.

There was found to be no significant association ($p>0.001$) using Chi square test among all the dietary habits and BMI except participation in crash diet where the $p<0.001$ hence establishing a significant association. Contrary to the finding of significant association between skipping of meals and BMI by Kumar et al there was no significant association found in this study.¹⁶ Additionally, there was found to be no significant association ($p>0.001$) using Chi square test among all the dietary habits and Perceived Stress Scale (PSS) score.

In overall study population, the correlation between perceived stress and body mass index calculated by correlation using Pearson's coefficient was found to be significant at $p<0.001$ and $r=0.510$. Hence concluding that statistically the significance is a linear relationship and the direction of the relationship is positive as indicated in the scatter dot graph (Figure 1) meaning that increased Perceived Stress has an effect on Body Mass Index. In the male study population, a significant positive correlation was found between Perceived Stress and BMI at $p<0.001$ and $r=0.536$ in accordance with Gupta et al

where positive correlation was observed (with $p < 0.01$ and $r = 0.362$).¹⁴ In the female study population, a significant positive correlation was found between Perceived Stress and BMI at $p < 0.001$ and $r = 0.475$ contrary to Gupta et al where no significant correlation was observed.¹⁴

CONCLUSION

This cross sectional study encompassed all the medical undergraduate students including CRRIs to give a broader and inclusive insight. This study has shown that despite the students having awareness about balanced diet the implementation of it has much scope for improvement with reduction in practicing unhealthy dietary habits that include frequent consumption of junk food and skipping meals. The majority of the students classified into the 'normal' BMI category with overall prevalence of obesity at 7% and overweight at 26.7% with male students having a higher mean BMI. The majority of the students at 52% perceived 'moderate' levels of stress with male students having a higher mean PSS score than female students. In view of the significant correlation and positive linear relationship between Perceived Stress and Body Mass Index, it can be concluded that higher levels of perceived stress among students including CRRIs lead to overall higher values of Body Mass Index. It is therefore, of utmost importance that stricter and nutritious dietary habits be formed by these young physicians-in-training as they are in their early formative years. In addition, implementing other physical and psychological health services can be of aid to optimize their productivity so that they may serve the society in many years to come.

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