DOI: 10.7860/JCDR/2017/25346.9458

Original Article

Health Management and Policy Section

The Impact of Eating and Exercise Frequency on Weight Gain - A Cross-Sectional Study on Medical Undergraduate Students

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ABSTRACT

Introduction: Diverse factors influence an individual's ability to successfully achieve and maintain energy balance consistent with a healthy body weight. Eating frequency is one among the varied feature that thought to have a direct impact on the body weight gain.

Aim: The present cross-sectional study has been carried out with the intention of awareness of food habit that specifically emphasize the frequency of eating and its effect on weight gain of an individual.

Materials and Methods: This cross-sectional study involved 265 medical undergraduate students. Faculty validated close ended questionnaire was distributed to the students and the responses given by them were then analysed. Statistical evaluation of data with Spearman correlation coefficient (r) was done.

Results: Among the total 265 participants, 177 (66.8%) were noted to have normal Body Mass Index (BMI 18.5-24.9). Out of them, 113 (64%) found to have eating frequency 3-4 meals/day, 44 (25%) with 1-2 meals/day, 18 (10%) with 5-6 meals/day and 2 (1%) with more than 6 meals/day. Low positive correlation (r=0.09) between mean frequency of eating and the number of subjects with normal BMI was observed.

Conclusion: An increase in the eating frequency can also be correlated with an increased prevalence of normal BMI individuals provided adequate physical exercise.

Keywords: Body weight, Disease control, Food frequency, Physical exercise

INTRODUCTION

Eating right has been regarded as consuming a balanced diet. Biochemically, a balanced diet is made up of different food constituents in desired proportions, to meet energy and nutritional requirements of an individual. Individual differences in eating style have been hypothesized to contribute both to underweight and overweight [1]. There is presently no valid scale to assess the range of dimension of eating style. The eating behaviour of an individual is generally evaluated with the parameters that include approachability to food, enjoyment of food, satiety responsiveness, eating habit, fussiness, emotional overeating and under eating as well as the desire for drinks [2].

Obesity and eating disorder is becoming a major socio-demographic concern, particularly among adolescents due to their higher prevalence and adverse influence on psychological status [3] as well as physical health [4]. According to Centre for Disease Control and Prevention Growth charts [5], the occurrence of overweight among young children has remarkably increased over the past three decades particularly with age ranging between 6 and 19 years [6].

Gender discrepancies in intake and selection of food are also apparent in young individuals. According to the previous study report, males prefer to have food with more calories. On the other hand, under the pressure to be thin physique, dieting behaviour is more observed among young girls [7]. Therefore, the effect of psychological factors on eating behaviour is accountable in understanding the aetiology of body weight disorders.

The present study has been carried out with the intention of awareness of food habit with the detailed emphasize on the frequency of eating and its effect on weight gain in young adults. Detailed facts on individual's food intake behaviour such as quality and quantity of food and its relation with weight gain have also been considered in this study. This is to instill a better knowledge on the consequences of different eating behaviour which also contributes to weight gain.

MATERIALS AND METHODS

The present cross-sectional study involved a total of 265 students comprising of 104 males and 161 females with the age ranging from 18-20 years. All the participants were of MBBS (Bachelor in Medicine and Bachelor in Surgery) students studying preliminary two years of medical curricula at Melaka Manipal Medical College, Manipal University, Manipal, India. Self developed and subject expert faculty questionnaire was introduced. The questionnaire comprised of 13 close ended questions. All the questions were mostly related to students eating habit including types of food, frequency of eating, frequency of physical exercises etc. BMI of all the participants calculated as per standard protocol and categorized according to World Health Organization (WHO) categorisation [Table/Fig-1] [8]. Ethical approval from Institutional Ethical Committee and informed consent from the participants were obtained prior to the study. The study was performed in the duration of 12 months (August 2011-September 2012).

The response rate from the participants was 100% and all the responses were compiled into data. Relevant graphs and tables were designed for the comparison purpose. A statistical analysis of Pearson product-moment correlation coefficient (r) was computed to assess the relationship between the eating frequency and the number of students with normal BMI.

RESULTS

The tables and graphs represented here correspond to the comprehensive responses to the series of questions in the questionnaire provided. The overall data was obtained based on the responses given by the voluntary participants. Accordingly, in the present study, the distribution of subjects as based on their BMI showed ranging from 16.0 -39.9. Amongst, higher prevalence i.e., 66.8% (177 out of 265) was observed with normal BMI (18.5-24.9) and least prevalence (2 out of 265) was noted for obese class II category [Table/Fig-2].

Class	Body Mass Index (BMI in kg/m²)
Severe underweight	< 16
Moderate underweight	16.0 – 16.9
Mild underweight	17.0 – 18.49
Normal	18.5 – 24.9
Overweight	≥ 25
Pre obese	25 – 29.9
Obese class I	30 – 39.9
Obese class II	35 – 39.9
Obese class III	≥ 40

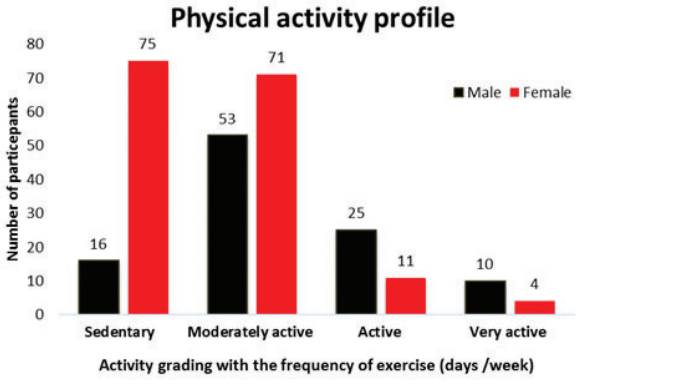
[Table/Fig-1]: International classification of BMI by World Health Organization (WHO).

Frequency (times a day)	Body Mass Index (BMI in Kg/m²)							
	< 16	16.0 - 16.9	17.0 - 18.49	18.5 - 24.9	25 - 29.9	30 - 39.9	35 - 39.9	≥ 40
1-2	0	3	5	44	11	1	1	0
3-4	0	3	27	113	24	4	0	0
5-6	0	0	6	18	1	0	1	0
> 6	0	0	1	2	0	0	0	0
Total (n=265)	0	6	39	177	36	5	2	0

[Table/Fig-2]: Participants' BMI index according to their eating frequency.

Frequency of meals/day	Total number of subjects	Number of subjects with normal BMI	Percentage of prevalence
1-2	65	44	67
3-4	171	113	66
5-6	26	18	69
>6	3	2	66
Total	265	177	66.8

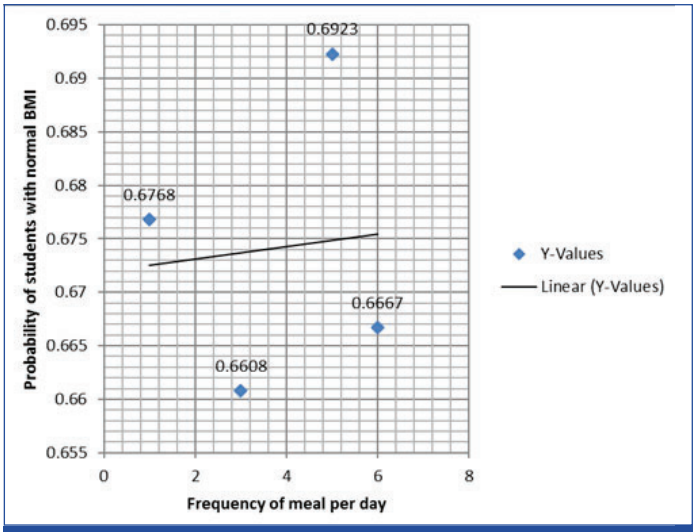
[Table/Fig-3]: Eating frequency, BMI score and incidence profile of normal BMI subjects with the prevalence (in percentage).



[Table/Fig-4]: Activity profile with the frequency of exercise of participants.

Among the 177 participants with normal BMI, 113 (64%) found to have eating frequency of 3-4 meals/day which was followed by 44 (25%) with 1-2 meals/day, 18 (10%) with 5-6 meals/day and 2 (1%) with more than 6 meals/day [Table/Fig-3].

The overall activity profile of all the participants was compiled into four categories based on their frequency of physical exercise: i) Sedentary (No physical exercise; score 0); ii) Moderately active (1-2 days/week; score 1-2); iii) Active (3-4 days/week; score 3-4); and iv) Very active (5-7 days/week; score 5-7). Accordingly, as many as 47% (124 with 53 males and 71 females) participants were regarded as moderately active category, which was followed by 34% (91 with 16 males and 75 females) sedentary, 14% (36 with 25 males and 11 females) as an active and 5% (14 with 10 males and 4 females) were of very active category [Table/Fig-4].



[Table/Fig-5]: Scatter plot showing the low positive correlation (r = 0.09*) between eating frequency and number of students with normal BMI.
*Correlation is insignificant at 0.05 level (p>0.05)

Interpretation of correlation: Pearson correlation analysis revealed a low-positive correlation (r = 0.09) between mean frequency of eating and the number of participants with normal BMI. The increase in the eating frequency correlated with an increase in a number with normal BMI. However, the correlation is statistically non significant at 0.05 level (p=0.1). Relevant scatter plot summarizes the result [Table/Fig-5].

DISCUSSION

The major public health problem affecting worldwide is an excess body weight [9]. Various factors influence an individual's ability to successfully achieve and maintain energy balance consistent with a healthy body weight. The family environment and peer pressure, sociocultural and economic context, concern over body image, gender and age issues, eating away from home and media habits are some of the issues that could influence the eating behaviour of an individual [10].

In spite of handiness of an adequate number of scientific research reports on the impact of eating behaviour on body weight, no unanimous conclusion could be possible to establish relative importance of the frequency of eating events for weight control [11].

Abnormal eating behaviour is often associated with body weight dissatisfaction as it is frequently seen in individuals dieting for weight loss. According to Nasser, the attitude of abnormal eating behaviour was largely restricted to western societies in the past [12]. This is evident from the previous study reports that focussed on ethnicity. Some studies upholds the lower prevalence of body weight dissatisfaction and disordered eating behaviour in Asian population [13,14], while others report higher trend of body dissatisfaction with increased desires for slimness amongst Chinese [15,16].

Based on a recent research conducted, it was shown that increase in the frequency of eating, decrease the risk of accumulation of excess adipose tissue. Besides that, it also reduces the risk factor of developing chronic diseases such as poor glycaemic control and high blood cholesterol [17].

Result data of present study clearly showed interrelation between the frequency of meal consumed per day and the body weight. The higher the frequency of the meal (the optimum being 3-6 meals per day) enables achievement of healthy body weight. Nevertheless, the weight of an individual is not solely based on the frequency of eating but it is influenced by many factors. The major factor would be the lifestyle of the individual. This element is also evident from our data as the majority of the students with moderately active lifestyle are managed to maintain a healthy body weight.

Among the female participant of the survey nearly half of the

participant population admit that their eating frequency increases during or before menstruation. This is probably due to hormonal changes that occur during the period of time. Some of them even may try to divert their mind from the discomfort by consuming more food thus contributing to the weight gain.

The association between early nutritional detriment and later weight gain as reported on Indian population makes a strong indicator of enhanced morbidity [18]. It is important to note that in addition to eating frequency, other aspects of a person's diet such as portion consumed, and energy density might affect total energy intake [19].

According to Leidy et al., it is premature to recommend specified eating frequency for weight control based on the literature reports due to lack of factors in the study conducted [20]. The present findings support this argument, as it has been observed that the statistical insignificant low positive correlation between eating frequency and individuals with normal BMI.

LIMITATION

Though we have done this cross-sectional study on adequate number of subjects, the data obtained were based on self report responses and thus no casual relationships can be unambiguously established.

CONCLUSION

We conclude that, higher the frequency of eating per day (with an optimum being 3-6 meals per day), the weight gain is minimal thus allowing the individual to be within healthy BMI range, given that the quantity and the quality of the food consumed is appropriate. Proper awareness should be considered in order to prevent youngsters who are vulnerable to unhealthy eating habits such as the trend of dieting by skipping meals. Further, an increase in the eating frequency can also be correlated with an increased prevalence of normal BMI individuals provided adequate physical exercise.

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FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Nov 11, 2016**
Date of Peer Review: **Dec 09, 2016**
Date of Acceptance: **Dec 27, 2016**
Date of Publishing: **Feb 01, 2017**