

# Dietary habits and menarche among young female medical students

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## ABSTRACT

**Background:** Menstrual cycle is a physiological change that occurs in female subjects. The first menstruation of women is called menarche. The developmental status of a pubertal female can be assessed using this vital maturity indicator. The age of menarche is determined by number of factors such as general health, genetic factors, and socioeconomic and nutritional statuses. **Aims and Objective:** To find out the role of different dietary habit of vegetarian, eggetarian, and nonvegetarian on age at menarche and academic performance among young girls. **Materials and Methods:** The data were collected through personal interview technique using the especially structured questionnaire. The general profile, dietary habits, and menarcheal profile of the subjects were collected. The height and weight of the subjects were measured by standardized methods. The body mass index of the subjects were calculated and categorized accordingly. The academic performance of the girls was measured using the percentage marks obtained by the end of the academic year. **Result:** The nonvegetarian girls revealed early menarche and prolonged menstrual cycle and menses when compared with vegetarian and eggetarians counterparts, and they were more prone to overweight and obese. However, in academic performance nonvegetarian showed better performance than vegetarian and eggetarians. **Conclusion:** Our observation concludes that nonvegetarians was more prone to overweight and obese, early menarche, prolonged menstrual cycle and duration of menses, but better in academic performance than eggetarians and vegetarians, this change of normal menstrual pattern of young women may affect their well-being. Health education is needed about menstrual pattern. We recommend proper advice on diet and exercise, which will improve health, sense of well-being, and overall quality of life of the students.


**KEY WORDS:** Menarche; Menstrual; Dietary Habit; Educational Performance

## INTRODUCTION

An obvious effect on growth and maturation is exerted by nutritional factors. Good nutrition contributes to healthy growth and development. Awareness of the nutritional effects

of food patterns is vital to propose strategies that aid in enhancing adolescent nutrition because occurrence of any nutritional disorder in this period can affect educational performance and can damage body functions and working capacity. The first menstruation of women is called menarche. The developmental status of a pubertal female can be assessed using this vital maturity indicator.<sup>[1,2]</sup> The menstrual cycle, with a mean length of 28 days, is an indication of a woman's reproductive health. Menarche is a period from where the commencement of menstruation occurs. Menarche occurs averagely at the age of 12 years.

Several factors have been associated with sexual development, which impacts age at menarche.<sup>[3]</sup> It is well established that nutritional factors have a noticeable influence on growth

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and maturation. Previous studies have revealed that early age at menarche is related to the higher occurrence of breast and endometrium cancers.<sup>[4]</sup> Childhood undernourishment can postpone the beginning of menstruation but does not prevent its incidence. Some amount of body fat and approximate weight is necessary in female adolescents for starting the menstruation.<sup>[5]</sup> Several studies have observed that menarche can be anticipated by obesity.<sup>[6]</sup> In recent years, developing countries such as Brazil experienced issues associated with the modifications in the nutritional profile of their populations.<sup>[7,8]</sup> Formerly, malnutrition owing to its high prevalence was an issue; currently, the overweight and obesity rates have become the most important problems.<sup>[9]</sup> Body mass index (BMI) influences the age at menarche and duration of the menstrual cycle, and regularity of the cycle are associated to ovarian steroid production levels. These are influenced by several factors, including body weight and percentage fat distribution.<sup>[10]</sup>

Keeping these points in view, this study attempted to find out the role of different dietary habit of vegetarians, eggetarians, and nonvegetarians on age at menarche and academic performance in young girls.

## MATERIALS AND METHODS

This study was carried out on healthy female students of MBBS and dental students in the age group of 19–25 years (45 vegetarian, 25 eggetarians, and 30 nonvegetarians) with regular menstrual cycle. Ethical clearance was taken to perform this study in the Department of Physiology of People's College of Medical Science and Research Centre, Bhopal (PCMS/OD/2015/1069; IEC-2015/3), Madhya Pradesh, India. Subjects with irregular cycles, gynecological disorders, anemia, history of drug intake affecting menstrual cycle, or history of chronic diseases were excluded from the study. Study protocol was explained to the subjects and informed consent taken from each of them. A well-formulated and pretested questionnaire was distributed to collect the data about age, sex, family occupation, family monthly income, dietary habits, and menarcheal profile. Anthropometric measurements (height, weight, and BMI) were also measured to assess the nutritional status.<sup>[6]</sup>

BMI was calculated by  $BMI = \text{weight}/\text{height}^2$  ( $\text{kg}/\text{m}^2$ ). According to WHO,<sup>[11]</sup> subjects were evaluated for underweight ( $\leq 18.50 \text{ kg}/\text{m}^2$ ), normal ( $18.50\text{--}25 \text{ kg}/\text{m}^2$ ), overweight ( $25\text{--}30 \text{ kg}/\text{m}^2$ ), and obese ( $\geq 30 \text{ kg}/\text{m}^2$ ). Finally, subjects were classified into three diet groups: vegetarians ( $n = 45$ ), eggetarians ( $n = 25$ ), and nonvegetarians ( $n = 30$ ). The academic performance of the girls was evaluated by using the percentage of the marks obtained by the end of academic session of their college as follows: poor (1%–45%), average (46%–64%), good (65%–84%), and excellent (85%–100%).

### Statistical Analysis

Data are expressed as mean  $\pm$  standard deviation (SD), and each parameter showed six observations. All data were analyzed with

the SPSS for windows statistical package (version 20.0; SPSS Institute, Inc., Cary, NC). Statistical significance between the different groups was determined by one-way analysis of variance (ANOVA), followed by Tukey's multiple comparison tests when the groups showed significant difference, and the significance level was fixed at  $p \leq 0.05$ .

## RESULTS

### Effect of Different Dietary Habit on Overall BMI

The data are summarized in Table 1 with mean  $\pm$  SD. The height and weight of eggetarians and nonvegetarians was more marked than vegetarians, but there was no significant variation among these groups. However, BMI also showed no significant alteration among these groups.

### Effect of Different Dietary Habit on Classification of BMI

The data are summarized in Table 2. The classification of BMI in different dietary habits showed that there was no marked variation between vegetarian and eggetarians groups. However, nonvegetarian group showed more prone to overweight and obese, when compared with eggetarian and vegetarian groups.

### Effect of Different Dietary Habit on Age at Menarche

The data are summarized in Figure 1 as mean  $\pm$  SD. There was no significant alteration in age at menarche among vegetarian and eggetarian groups. However, menarche age was earlier nonvegetarian groups when compared with vegetarian and eggetarians groups.

### Effect of Different Dietary Habit on Menstrual Cycle Length

The data are summarized in Figure 2 as mean  $\pm$  SD. Among

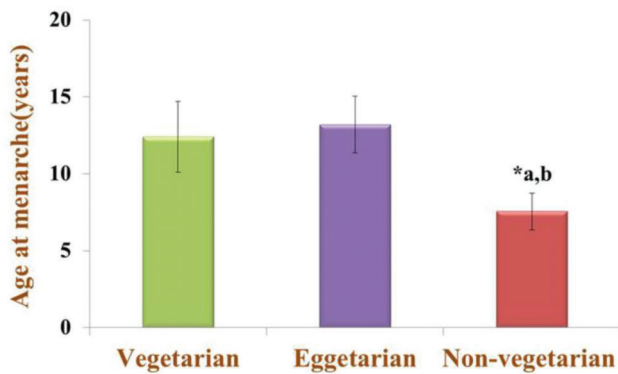
**Table 1:** Body mass index (BMI) in different dietary habit

	Vegetarian (n = 45)	Eggetarian (n = 25)	Nonvegetarian (n = 30)
Height (cm)	150 $\pm$ 5.84	155 $\pm$ 7.20	161 $\pm$ 8.38
Weight (kg)	50 $\pm$ 2.09	52 $\pm$ 1.87	55 $\pm$ 1.76
BMI ( $\text{kg}/\text{m}^2$ )	22.54 $\pm$ 5.20	25.22 $\pm$ 6.20	42.56 $\pm$ 7.45 <sup>a,b</sup>

\*Significance at  $p \leq 0.05$ , where (a) compared with vegetarians, (b) compared with eggetarians.

**Table 2:** Classification of body mass index (BMI) in different dietary habit, as recommended by WHO

BMI ( $\text{kg}/\text{m}^2$ )	Vegetarian (n = 45)	Eggetarian (n = 25)	Nonvegetarian (n = 30)
Normal (18.50–25)	34	12	8
Underweight ( $\leq 18.50$ )	5	2	2
Overweight (25–30)	4	8	15
Obese ( $\geq 30$ )	2	3	5



**Figure 1:** Effect of different dietary habit on age at menarche, \*significance at  $p \leq 0.05$ , where (a) compared with vegetarians, (b) compared with eggetarians.

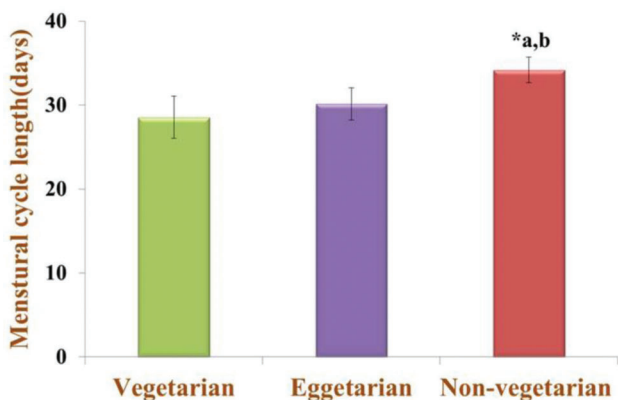
vegetarian and eggetarian groups, no significant variation in menstrual cycle length was observed. However, menstrual cycle length was significantly prolonged in nonvegetarian group when compared with vegetarian and eggetarians groups.

**Effect of Different Dietary Habit on Duration of Menses**

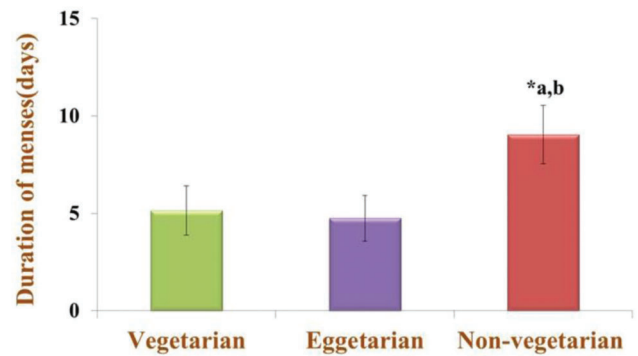
The data are summarized in Figure 3 as mean  $\pm$  SD. The duration of menses was similar between vegetarian and eggetarian groups. However, the duration of menses was significantly prolonged in nonvegetarian groups when compared with vegetarian and eggetarian groups.

**Effect of Different Dietary Educational Performance**

The data are summarized in Table 3. The educational performance at the end of the year among vegetarian and eggetarian groups showed no significant variation. However, nonvegetarian group showed better educational performance, when compared with eggetarian and vegetarian groups.



**Figure 2:** Effect of different dietary habit on menstrual cycle length, \*significance at  $p \leq 0.05$ , where (a) compared with vegetarians, (b) compared with eggetarians.



**Figure 3:** Effect of different dietary habit on duration of menses, \*significance at  $p \leq 0.05$ , where (a) compared with vegetarians, (b) compared with eggetarians.

**DISCUSSION**

The food habits effects affects the nutritional status. Nutrition has continuously been a main significant aspect in the pubertal growth period. Nutritional status also affects the academic performance of individuals. Previous studies had made an effort to find the relationship of dietary habit and age at menarche.<sup>[12]</sup> Menarche age was related to the amount of protein, and particularly the meat, consumed.<sup>[13]</sup> We observed that, in food habits of vegetarians and eggetarians, there is no significant change in menarche, while in food habits of nonvegetarians, early menarche was reported. Shastree et al.<sup>[14]</sup> showed that nonvegetarian girls would menstruate about 6 months earlier than vegetarian girls. Bagga and Kulkarni<sup>[15]</sup> also found similar outcome among Maharashtrian (Indian) girls. We also found prolonged menstrual cycle and menses in nonvegetarian group, which may be because of the involvement of more number of overweight and obese people. Nonvegetarian girls also showed significant increase in BMI when compare with eggetarian and vegetarian girls; this suggest that nonvegetarians are more prone to overweight and obese. The girls who will have more maximum mean body weight are more prone to achieve menarche earlier.<sup>[15]</sup>

Particular dietary nutrients that pose direct effects or indirect effects, for example, by modulating circulating sex steroid status, can affect menstrual regularity.<sup>[16]</sup> Nonvegetarian subjects are more prone to menstrual irregularity when compare with the vegetarian subjects.<sup>[17]</sup> The food habits affects

**Table 3:** Educational performance at the end of year in different dietary habit

Percentage of academic marks	Vegetarian (n = 45)	Eggetarian (n = 25)	Nonvegetarian (n = 30)
1-45 (poor)	10	9	3
46-64 (average)	21	7	5
65-84 (good)	9	5	12
85-100 (excellent)	5	4	10

the food intake, and the food intake affects the nutritional status. Nutritional status affects the academic performance. This study observed that nonvegetarian subjects showed better academic performance than vegetarian and eggetarian groups.

### Limitation

This study, relationship between dietary habit and menarche, was conducted only on smaller number of subjects; further research is needed to explore more about menarche and dietary habits in large number of population to get substantiation result.

### CONCLUSION

This study has determined the relationship between different dietary habits with age at menarche, menstrual cycle, and duration of menses along with academic performance among young female medical students. Our observation conclude that nonvegetarian subjects were more prone to overweight and obese, early menarche, and prolonged menstrual cycle and duration of menses but better in academic performance than eggetarian and vegetarian groups. This change of normal menstrual pattern of young women may affect their well-being. Health education is needed about menstrual pattern. We recommend proper advice on diet and exercise, which will improve health, sense of well-being, and overall quality of life of the students.

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