



## Research Article

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### IMPACT OF DIET AND LIFESTYLE ON AGE OF MENARCHE

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#### ABSTRACT

Menarche is a medical term that describes a woman's first menstrual period, marking the onset of menstruation and reproductive maturity. Menarche typically occurs during adolescence, usually between the age of 10 to 16 years. Various factors, including genetics, nutrition, body weight, and overall health, influence the onset of menarche. The impact of diet and lifestyle on the age of menarche in adolescent subjects was studied. A cross-sectional survey design was employed, involving a minimum of 203 subjects in and around Vijayanagar, Bangalore. Subjects were categorized into three groups based on the age at which they attained menarche: Group 1 (before 12 years), Group 2 (between 12-14 years), and Group 3 (above 14 years). Results of this survey showed a varied distribution of age of menarche: 8.0 % below 12 years of age group, 80 % between the age group 12-14, and 12 % above 14 years of age group. The dietary habits and consumption of ksheera (milk), ghrita (ghee), junk foods, caffeine, iron-rich foods, and water intake were examined, and other factors such as menarcheal age and status of agni (digestive fire), samashana (eating wholesome and unwholesome food together), ajeernashana (eating without the previous meal getting digested), adhyasana (eating excess), guru ahara (heavy food), sheeta ahara (cold food), viruddha ahara (food having opposite potentials), exercise, emotional resilience, co-curricular activities, use of antibiotics, stress relation, exposure to sunlight of the subjects were also evaluated. The survey findings highlight diverse menarcheal ages, suggesting potential links with diet and lifestyle.

**Keywords:** Diet, Lifestyle, Menarche, adolescent, menstruation, nutrition, health, agni (digestive fire), adhyasana (eating excess), viruddha ahara (food of opposite potential).

#### INTRODUCTION

Menarche is defined as the first menstrual period in a female adolescent. Menarche typically occurs between the ages of 10 to 16 years, with the average age of onset being 12.4 years.<sup>1</sup> Menarche is a product of complex hormonal changes involving the hypothalamus, pituitary gland, and ovaries. The maturation of the hypothalamic-pituitary-ovarian axis leads to the release of hormones, particularly estrogen, which triggers the development of secondary sexual characteristics which mark the beginning of the menstrual cycle.<sup>2</sup> When women experience menarche, the flow of menstrual blood varies, ranging from a slow and irregular discharge to a consistent flow lasting up to 3-7 days. The colour of the menstrual blood can vary from brown to bright red, and it's normal for women to have light or heavy periods; no two women will undergo an identical menstrual experience.<sup>3</sup> Acharya Sushruta, while explaining the age of menarche and the development of secondary sexual characteristics, says that the upachaya of rajas (onset of menarche) is associated with the gradual development of secondary sexual characteristics, and once these characteristics achieve maturity, then the girl attains menarche. During this process, if the girl does not follow proper ahara (food) and vihara (regimen), it impacts the menarche's age.<sup>4</sup>

Acharya Vagbhata has also emphasized that when a girl indulges in nithya sevana of dugdha and ghrita (regular intake of milk and ghee) the arthava (mensus) during the rathukala (menstrual cycle) will be present for a long period and the opposite, that is when they indulge in Pittakara (increasing Pitta) and Vatakara ahara (food increasing Vata), then the rutu kala (menstrual cycle) can be alpa (less).<sup>5</sup> Hence, during the period of menarche as well as the adolescence period, the diet should include dugdha (milk), ghrita (ghee) and other substances which help in nourishing the organs and also to balance the hormones leading to menarche at the right time.

Further, Kashyapa says that as the baala (girl) has heena kaaya (underdeveloped body), the rakta (blood) first nourishes the kaaya (body) and then once it is completely nourished, the rakta (blood) nourishes the yoni (female reproductive system) and then she will attain menarche.<sup>6</sup>

Hence, the age of menarche is variable, and it depends on the interaction between hereditary factors, diet and lifestyle and environmental factors.

**Objective:** The study's objective is to analyze the dietary habits and physical activities that can impact menarche's age.

## METHODOLOGY

### Study Area

A cross-sectional descriptive survey was conducted among 203 subjects in and around Vijayanagar, Bangalore, Karnataka, India.

### Type of study: Survey study

A questionnaire consisting of 46 questions was used in data collection. Questionnaires were scientifically framed and assessed for the data analysis.

The subjects who participated in the survey study were 203 in number. Subjects are divided into three sets of groups.

1st group attained menarche before 12 years of age.

2nd group attained menarche between 12-14 years of age.

3rd group attained menarche after 14 years of age.

### Selection Criteria

1. Female subjects at the age of puberty
2. All female subjects were taken in and around Vijayanagar, Bangalore, Karnataka, India, without considering their socioeconomic status.

### Data Collection, Analysis and Instrument used

Data was collected from the subjects through a questionnaire as a survey tool. Information obtained includes socio-demographic characteristics of the subjects, such as age, educational level of the mother, father's occupation, ethnic group, and place of residence. Questions relating to menstruation included the age at first menses, food habits, exercise, source of menarcheal information, and use of medical intervention during menstruation.

**Statistical tool:** Data obtained was recorded, tabulated and statistically analyzed using appropriate statistical methods.

All 203 subjects who had experienced menarche responded actively to the questionnaire. The data obtained were analyzed using descriptive statistics: frequency, percentages, mean, range, and graph. These were used to represent the categorical and continuous variables. The association between the age at menarche and some sociodemographic characteristics of the students were assessed using the statistics method.

**Confidentiality:** Data is confidential to the principal investigator and was not used for purposes other than the study.

### Sample Size and Calculation

The percentage of the subjects' attained menarche was calculated for the total sample size of 203 with the formula =  $x/n \times 100$

Where x= number of subjects attained menarche and n= total number of subjects.

**Ethical Consideration:** Informed consent was obtained from the Parent or guardian of the subjects and participants. A questionnaire prototype was given to the subjects and, for their parent perusal, typed in English.

## RESULT

The survey results among the sample size of 203 adolescent subjects who experienced menarche at different ages are as follows,

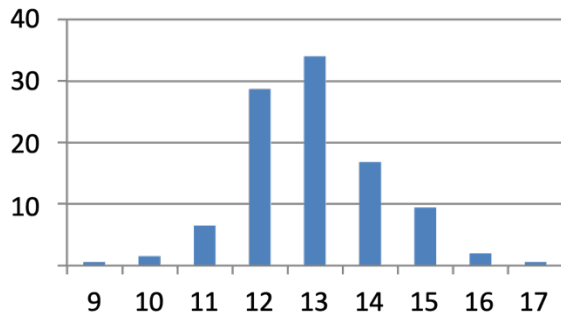
0.5% attained their menarche at the age of 9 years. 1.5% at the age of 10 years. 6.40% at 11 and 28.9%, 34%, and 16.8% at age 12,13,14, respectively. 9.4% at age 15 years. 2% at the age of 16 and 0.5% at age 17.

The total number of subjects who consumed ksheera (milk) daily was 49.75% compared to 50.25% not consuming ksheera (milk). The subjects who consumed ghrita (ghee) daily were found to be 69.45% compared to 30.55% of them not consuming ghrita (ghee). The subjects who consumed junk foods were only 12.80% compared to 87.19% who didn't have the habit of consuming it.

61.08% of the subjects had the habit of consuming fruits regularly as compared to 38.91% of the subjects who had no habit of consuming fruits. The amount of sprout consumption was observed to be 43.34% as compared to 56.66% of the subjects who did not have the habit of consuming sprouts. The caffeine intake was found to be 66.50% as compared to 33% who did not have a habit of taking caffeine. Among the total subjects, it was found that 23.64% of subjects actively participated in their co-curricular activities, 28.07% were very active, 41.4% were moderately active, and 6.89% were less active. About 20.69% of the subjects had sufficient water intake, 72.90% had moderate water intake, and 6.40% had less water intake. 20.69% of subjects were found to take sufficient iron-rich food as compared to 61.57%, who had a moderate intake and 17.73% of subjects who had minimal intake.

40.39% of subjects were observed to have samagni (proper digestive fire), whereas 20.68% had teekshnagni (increased digestive fire), 20.7% had vishamagni (improper digestive fire), 18.23% had mandagni (decreased digestive fire). Among the total sample, 32.01% have had the habit of doing ajeernashana (eating without the previous meal getting completely digested) as compared to 67.98% of subjects who didn't have that habit. Only 22.16% of subjects had the habit of consuming guru (heavy foods) and sheetala ahara (cold foods), compared to 77.83% of subjects who had no habit. About 66.50% were found to have the habit of adyashana (eating excess), and 33.49% had no habit of it. Around 63.55% had minimal usage of antibiotics, 29.55% had moderate usage, 4.43% had frequent usage, and 2.46% of subjects used antibiotics in excess. 15.76% of subjects had very resilient emotional status as compared to 63.54% of subjects who had moderate resilience and 14.78% had low resilience, only 4.92% of subjects had very low resilience, and 40.6% of subjects were exposed to sufficient sunlight daily as compared to 40.7% subjects who had frequent exposure, and 12.6% had infrequent exposure, only 6% had rare exposure. Screenshot was limited in only 19.70% of the subjects 66.99% had moderate screentime, and it was observed that 11.9% had high screentime, only 0.49% had excess screentime, 56.5% had regular bowel movement as compared to 35.9% subjects who mainly had regular bowel movement and 6.7% had irregular bowel movement, only 0.9% were found to be constipated. About 49.26% of subjects have a history of deworming as compared to 50.74% who had no history of deworming. Only 3.4% of the subjects had a history of thyroid dysfunctioning as compared to 96.5% of subjects who had no history of thyroid dysfunction.

The body mass index was calculated and found to be normal and appropriate for the age of all the subjects.



Bar graph showing the percentage of incidence of menarche at their respective ages.

Horizontal line: Age of menarche

Vertical line: Number of subjects attended menarche.

## DISCUSSION

Ksheera (milk), being a wholesome diet, is said to be Vatahara (decreases Vata) and plays a vital role in nourishing the body.<sup>5</sup> And hence, in this study, around 49.75% of subjects had the habit of regular intake of ksheera (milk). Ghrita (ghee) improves digestion, promotes vitality, and supports overall well-being. It is a samskara (processed) of navneetha (clarified butter). This increases the good cholesterol, the precursor of hormones like estrogen. This study found that 69.45% of subjects have had the habit of taking ghrita (ghee) every day. Both ghrita (ghee) and ksheera (milk) having snigdha (unctuous) and guru (heaviness) leads to Kapha vardhana (increases Kapha), which is of prime importance during childhood and adolescence period. This, in turn, also nourishes the rasa dhatu (the liquid entity of the body), and uttarothara dhatu poshana (nourishes the upcoming factors of the body's composition) also takes place, and our Acharyas explain the same. Once the dhatu poshana (nourishment of all aspects of the body) takes place and the body attains maturity<sup>7</sup>, the arthava (menstrual blood), upadhatu of rasa dhatu (subcomponent of rasa) also is nourished due to which menarche occurs. One of the research studies, "Study on the age of menarche between generations and the factors associated with it", shows that adolescent girls majorly spend their leisure time on electronic gadgets, whereas only 20 % were involved in outdoor activities. Notably, 70% of the girls had a screen time of >4 hours.<sup>8</sup> In our study, 19.70% of subjects had limited screen time for electronic gadgets. 23.64% were said to be active, and 22.16% were doing regular exercise.

Hence, this positively impacted attaining menarche at an appropriate age. Similarly, another study, "Association of Active and Sedentary Behaviors with Postmenopausal Estrogen Metabolism", shows that a sedentary lifestyle, which has been practised, decreases metabolism and high levels of endogenous estrogen, leading to early menarche.<sup>10</sup> Whereas in our study, it was observed that among 203 subjects, only 22.16% consumed high-fat food, 12.80% consumed processed foods and only 22.16% had the habit of consuming guru (heavy) and sheeta ahara (cold foods). These factors might have helped attain menarche at the appropriate age. Fruits and Vegetables contain cellulose and flavonols, which are known for their antioxidant properties. Research suggests that a diet rich in flavanols is associated with various health benefits. Antioxidants, including those found in flavanols, help reduce stress and inflammation, positively affecting overall health and may indirectly affect menstrual health. In our study, about 61.08% of subjects had the habit of consuming fruits on a daily basis. This might have a positive impact on maintaining good health. A recent theory by Belsky, Steinberg and Draper 1991 suggested that environmental stress

experienced by adolescent girls may trigger early menarche in them.<sup>10</sup> In our study, it was observed that only 6.85% had significant peer pressure, and only 4.92% of subjects had very low emotional resilience. In the present study, though subjects were selected irrespective of their socioeconomic status, it was noted that almost all of the subjects were from middle-class and upper-middle-class families, and their impact of diet, nourishment and healthy lifestyle have contributed to attaining the menarche at the acceptable ages.

Precocious puberty is a condition in which a child's body begins changing into that of an adult too soon, usually before the age of 8 in girls and before 9 in boys.

Precocious puberty is caused when the brain starts producing a hormone called gonadotropin-releasing hormone (GnRH). When this hormone reaches the pituitary gland, it leads to more testosterone in the testicles in males and more estrogen in females, resulting in early maturity.<sup>11</sup>

**Causes:** The causes of precocious puberty may be idiopathic, organic brain lesions, hypothalamic hamartoma, brain tumours, head trauma, hydrocephalus, myelomeningocele, Treated CAH, McCune-Albright syndrome, etc.

Delayed puberty is a condition that happens when the physical signs of sexual maturity don't appear by the age of 12 in females and 14 in boys. This occurs because of various reasons like family history, medical issues, etc.<sup>11</sup>

**Causes:** The causes for delayed puberty may be ovarian insufficiency, hereditary, underweight, nutritional deficiency, eating disorders, hormonal imbalance, etc.

## CONCLUSION

Among 203 adolescent subjects taken as the sample size for the study, 80 % of subjects attained their menarche at the appropriate age because all of them had a Body Mass Index (BMI) proportional to their age. The findings of this study show that subjects were found to be following a healthy lifestyle, having good dietary habits, and having good nourishment. The factors like regular intake of ksheera (milk) and ghrita (ghee), regular physical activities, proper sleeping hours, consuming fruits, minimal antibiotic usage, minimal peer pressure, less screen time, consumption of water, exposure to sunlight, sufficient intake of iron-rich food had an impact in attaining the menarche at the appropriate age. Other factors like a sedentary lifestyle, increased intake of caffeine, excess stress, high screentime, habit of day sleep, etc., would negatively impact the age of menarche. No features of precocious puberty or delayed puberty were observed.

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