



Dietary Pattern and Onset of Menarche among High School Students - A Correlational Study

Greeshma KC¹, Senthilkumar T^{2*}, Johnson LK³, Babu A⁴, Sunil AM⁴, Shaji A⁴, Sabu K⁴ and Salima NM⁴

¹Assistant Professor, Department of OBG Nursing, Lourde College of Nursing, India

²Professor cum Principal, Lourde College of Nursing, India

³Vice-Principal, Lourde College of Nursing, India

⁴Student, Lourde College of Nursing, India

*Corresponding author: Senthilkumar Thavasiappan, Professor cum Principal, Lourde College of Nursing, Taliparamba, Kannur, Kerala, India, Tel: 9746457669; Email: ns9605@gmail.com

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Abstract

Introduction: The early onset of menarche has been linked to various chronic conditions, yet limited research explores the role of dietary patterns in influencing menarche timing. This study examines the association between dietary habits and menarche onset in high school girls, to determine whether pre-menarche dietary patterns are prospectively linked to the onset of menarche. Methods: A descriptive survey was conducted among 150 high school girls at selected Higher Secondary Schools, selected via convenience sampling. Data on dietary habits before menarche, including frequency of consumption of meat, dairy, eggs, and fast foods, were collected.

Results: Most participants were aged 13, with menarche commonly occurring at age 12. The majority reported occasional weekly meat intake, daily dairy consumption, and occasional weekly egg and monthly fast-food intake. Statistical analysis indicated a positive correlation between dietary patterns and menarche timing, consistent with studies suggesting that diet quality, particularly protein and dairy intake, can influence puberty timing.

Discussion: Findings align with recent studies showing that higher intake of animal protein and dairy is associated with earlier menarche, potentially due to growth-promoting hormones. These results underscore the need for monitoring dietary habits among adolescents.

Conclusion: Prioritizing adolescent health, particularly for girls, is essential for policymakers and parents. Awareness of the potential impact of diet on puberty timing can guide healthier dietary choices for young girls.

Keywords: Menarche; Dietary Patterns; Adolescents; Puberty Onset; High School Girls; Nutritional Impact

Introduction

Adolescence represents a pivotal stage in human development, characterized by a multitude of physical, psychological, and social transformations (this transitional

phase prepares individuals for myriad responsibilities and roles associated with adulthood). Ultimately, it leads to the formation of a personal identity and an increased sense of autonomy. Although the length of adolescence can differ significantly among various cultures, it consistently

involves a complex interplay of biological, physical, and psychological changes. Puberty, which marks the beginning of adolescence, is defined by the growth and maturation of sexual organs (thus establishing the groundwork for reproductive capabilities). In females, menarche-the onset of the first menstrual period-emerges as a notable milestone, signalling the start of reproductive potential and the onset of secondary sexual characteristics. However, it is essential to acknowledge that these transformations are not purely biological; they also include significant emotional and social dimensions, because adolescence is a multifaceted experience that shapes individuals in profound ways.

Menarche generally occurs between the ages of 12 and 16, with an average onset of around 14.7 years; however, numerous factors can affect its timing. Recent research has suggested that genetic predisposition, socioeconomic status, overall health, nutritional status, family size, physical activity, and even environmental elements (such as seasonal variations) play a significant role in determining the age at which menarche occurs [1]. Notably, changes in the timing of menarche reflect broader societal shifts, with evidence indicating that girls today are entering puberty at younger ages compared to previous generations [2]. This trend raises concerns, particularly because of its potential association with long-term health risks, including cardiovascular disease, metabolic disorders, and certain types of cancer in later life. Although the implications of these changes are still being investigated, they highlight the necessity of understanding the factors that influence the timing of menarche.

Need for the Study

Among the various factors that affect the timing of puberty, nutrition stands out as a critical element, especially regarding the initiation of menarche. Nutritional intake significantly impacts growth patterns, hormone production, and overall body composition; all these elements contribute to the development of puberty. In recent decades, the rising consumption of processed foods-characterized by high levels of fats and sugars-has been implicated as a factor leading to the earlier onset of puberty in girls. Studies indicate that diets abundant in animal protein, unhealthy fats, and added sugars may expedite the onset of menarche by elevating levels of growth-promoting hormones. However, nutrient deficiencies can result in a delay in puberty [3,4]. For instance, research conducted by Wang Y, et al. [5] identified a correlation between high-caloric diets and an earlier age of menarche, highlighting the significant role that dietary habits play in the timing of puberty onset.

Conversely, adequate nutrition during adolescence (a critical period) is essential to support the growth spurt that accompanies puberty; this heightens the demand for

macronutrients and micronutrients. Specifically, increased needs for protein, calcium, iron, zinc and folate are vital for the formation of muscle mass and bone density, as well as overall physiological development [6,7]. Adolescents with balanced diets rich in these nutrients are better equipped for optimal growth and pubertal progression. However, severe malnutrition-whether primary (due to inadequate intake) or secondary (due to eating disorders)-can result in delayed menarche and disrupted pubertal development [4]. Although the importance of nutrition cannot be overstated, many adolescents face challenges in meeting these dietary needs because of various socio-economic factors, thereby emphasizing the urgent need for targeted interventions.

Psychological factors (such as stress and body image issues) interact with nutrition; particularly, because of the rise of anorexia nervosa and bulimia among adolescents. These eating disorders (which carry significant nutritional risks) can impair growth and pubertal development [8]. The association between disordered eating, nutrient deficiency, and delayed pubertal milestones highlights the necessity to consider psychological health alongside nutritional intake when evaluating factors that influence menarche timing. However, this relationship is complex, and understanding it requires a multifaceted approach. Existing literature underscores the complex relationship between dietary patterns and menarche onset, as well as the implications of early or delayed menarche on future health. For instance, a longitudinal study by Berkey CS, et al. [9] demonstrated that girls who consumed higher amounts of animal protein before age 6 were more likely to experience earlier menarche. However, identified high glycemic index foods as contributing to earlier pubertal onset, although diets emphasizing plant-based proteins and healthy fats were associated with a more typical menarche age. This growing body of evidence supports the notion that diet plays an integral role in pubertal development because it has the potential to either advance or delay the timing of menarche depending on dietary quality.

In light of these findings (1), there exists a compelling necessity to further explore dietary influences on menarche within adolescents across diverse cultural and socioeconomic frameworks. Identifying patterns of dietary intake that correlate with either early or delayed menarche may facilitate the formulation of dietary recommendations and interventions designed to promote healthy development among youth. This study (2), entitled "Dietary Pattern and Onset of Menarche among High School Students - A Correlational Study," endeavors to address this exigency by scrutinizing the relationship between dietary habits and the timing of menarche among high school girls. However, the results will contribute to a more nuanced understanding of how specific dietary patterns may influence menorrhoeal timing; ultimately yielding insights that could (3) guide

nutritional policies and bolster parental education initiatives aimed at enhancing adolescent health and well-being. Although the complexity of dietary influences cannot be overstated, this research is pivotal because it seeks to unravel the intricate web of factors affecting menarche [10].

In conclusion (although), menarche is a natural and essential aspect of female development; however, its timing can be influenced by a range of factors, with nutrition playing a pivotal role. Investigating the correlation between dietary patterns and menarche onset is crucial for understanding how lifestyle and nutritional choices impact adolescent health outcomes. As the prevalence of early puberty increases globally (this is alarming), studies like this offer a foundation for developing evidence-based interventions to ensure healthy pubertal and reproductive development in young girls [11].

Research Statement

A study to assess the relationship between dietary patterns and onset of menarche among selected High School Students.

Objectives of the Study

- To assess the dietary habits of high school girls.
- To assess the onset of menarche among high school girls.
- To find out the correlation between dietary habits and the onset of menarche.

Hypothesis

There is a significant relationship between dietary patterns and the onset of menarche.

Methods of the Study

A descriptive survey approach was employed to assess the relationship between dietary patterns and the onset of menarche among high school girls in selected schools in Kannur district, Kerala. The study used a descriptive survey design, with the dietary pattern as the independent variable and onset of menarche as the dependent variable. Extraneous variables included age, weight, height, BMI, religion, residence, family income, parents' occupation and education, number of siblings, age of menarche, and dietary patterns. The study was conducted in selected high schools in Kannur district. A sample of 150 adolescent girls aged 13-16 years, who had attained menarche and were available at the time of data collection, was selected through convenience sampling. Exclusion criteria applied to girls below 13 or above 16 years, those who had not attained menarche, or were unavailable during sampling. Data collection involved a three-part tool: the first part gathered sociodemographic data (age, religion,

residence, family income, parents' occupation and education, number of siblings), the second part collected obstetrical data (age of menarche and menstrual pattern), and the third part assessed dietary patterns through questions on usual dietary intake.

Results of the Study

The findings of the demographic variables revealed that the majority of participants were 13 years old (48%) (Figure 1) and lived in semi-urban areas (50%). Most families had a monthly income between 3,908 and 11,707 (24%). Regarding dietary patterns, the majority of participants consumed meat and meat products occasionally (25.3%), eggs occasionally on a weekly basis (30.7%), and milk and milk products almost daily (46%). Additionally, the majority consumed fast food occasionally, about once per month (44%) (Figure 2).

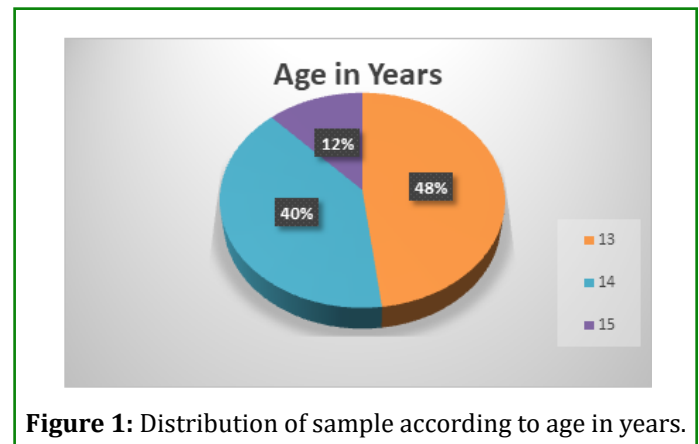


Figure 1: Distribution of sample according to age in years.

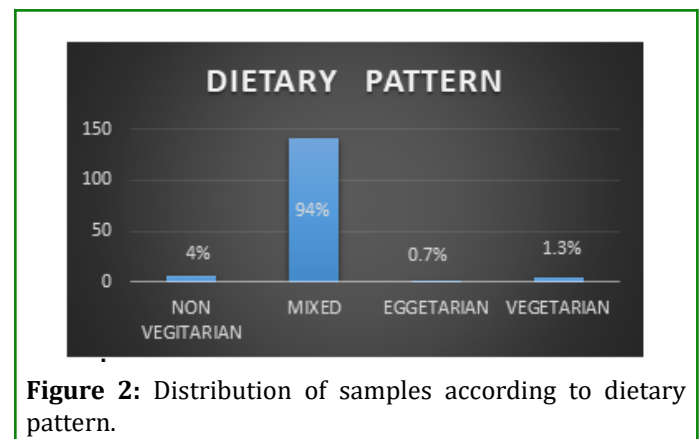


Figure 2: Distribution of samples according to dietary pattern.

The data indicated that the majority of students attained menarche at 12 years of age (41.3%). The correlation coefficient between the age of menarche and dietary habits of high school girls was found to be 0.047 (Table 1), indicating a positive correlation, as it lies between 0 and 1. Thus, there is a positive relationship between the age of onset of menarche and dietary patterns.

Variables	Correlation Coefficient	Inference
Age at onset of menarche	0.047	Positive Correlation
Dietary pattern		

Table 1: Correlation between age of menarche and dietary habits.

Discussion

The findings of this study indicate a positive correlation between dietary patterns and the age of menarche onset among adolescent girls, with a relatively significant proportion (41.3%) attaining menarche at the age of 12 years. These findings are in line with recent studies suggesting that nutritional intake is a crucial factor influencing pubertal timing. A correlation coefficient of 0.047, while modest, points to a positive relationship between dietary pattern and menarche age, consistent with studies that demonstrate the role of diet in modulating puberty onset.

Recent research indicates that dietary patterns abundant in animal proteins, fats, and processed foods may play a role in earlier menarche. For example, a study conducted by Wang Y, et al. [4] revealed that high intake of processed foods correlates with earlier puberty in girls, likely because of the growth-promoting hormones present in these foods. In this investigation, most participants reported occasional consumption of meat (and) meat products, eggs weekly, and fast foods monthly; these dietary habits could subtly influence the timing of puberty, potentially resulting in early menarche. Additionally, dairy intake was notably high among participants, with 46% consuming milk and dairy products daily. Previous studies, including those by Rogers IS, et al. [3], have connected dairy products with elevated levels of insulin-like growth factor (IGF-1), which may expedite pubertal onset in adolescents.

The study's findings (which are quite significant) align with a global trend of declining menarcheal age, likely attributable to improved nutrition and dietary patterns characterized by high-caloric and nutrient-dense foods [2]. However, although these findings emphasize the impact of diet on pubertal onset, it is crucial to recognize the role of other factors—such as socioeconomic status, physical activity, and environmental influences. A study by Karapanou O, et al. [1] underscores that pubertal timing is multifactorial, affected by not only diet but also physical and psychosocial environments. In the present study, the majority of participants belonged to semi-urban areas, where access to diverse dietary options may be increasing, potentially impacting nutritional intake and consequently, menarcheal age.

Moreover, family income—an extraneous variable in this study—might significantly influence food quality and availability, thereby shaping dietary habits that subsequently affect growth and puberty. Girls hailing from households with adequate income may enjoy access to diverse and protein-rich diets, potentially accelerating pubertal development. However, factors such as caloric imbalance and nutrient deficiencies, prevalent in processed and fast-food diets, could adversely impact long-term health. This is evidenced by studies on adolescent dietary habits and development [5], which highlight the importance of balanced nutrition during these critical years.

Conclusion

The present study findings reinforce the significance of diet as a modifiable factor that affects the timing of menarche. Given the observed patterns, further studies could examine the impact of specific nutrients on puberty timing. The study also calls for a holistic approach to adolescent health. This approach should incorporate dietary guidance and awareness for families, schools and communities, to support healthy pubertal development. However, the complexity of dietary influences cannot be overstated, because individual needs vary greatly. Although many factors contribute to the timing of puberty, addressing nutrition is as crucial factor.

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