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IMPACT OF CONTEMPORARY AHARA AND VIHARA ON AGE AT MENARCHE: AN AYURVEDIC PERSPECTIVE

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ABSTRACT

Age at menarche is influenced by genetic, nutritional, metabolic, environmental and psychosocial factors. Contemporary adolescents are increasingly exposed to prolonged digital-media use, late-night screen exposure, sedentary behaviour, altered sleep–wake patterns and high calorie dietary habits. These factors may interact with adiposity and metabolic health and may contribute to variation in pubertal timing. Ayurveda provides a holistic framework for interpreting excessive nourishment and inactivity through Santarpaṇa, Santarpaṇajanya Vikara, Medovṛddhi and Sthaulya.

KEYWORDS: Early Menarche, Santarpaṇajanya Vikara, Sthaulya, Ahara, Vihara, Digital Media, Sleep Disturbance, Adolescent Health.

INTRODUCTION

Menarche is an important milestone in female reproductive development and represent pubertal maturation. Several interacting factors influence the age at menarche, including genetic predisposition, nutritional status, body composition, physical activity, sleep, metabolic status and environmental influences.[1] In recent decades, changes in lifestyle and dietary patterns have been accompanied by increasing childhood and adolescent obesity, sedentary behaviour and alterations in pubertal timing. Early menarche is

of particular concern because it may be associated with subsequent menstrual irregularities, metabolic disorders, psychological difficulties and adverse reproductive health outcomes.

Puberty is the transitional phase of growth and development which links childhood to adulthood. During this period, some morphological, physiological and psychological changes take place in body that leads to gradual development of secondary sexual characteristics therefore full sexual maturity and accordingly fertility. According to Tanner and Marshall, five important physical changes (growth spurt, breast budding, pubic and axillary hair growth, peak growth in height and menstruation in orderly) are manifested during puberty.[2]

From an Ayurvedic perspective, the health of a child and adolescent is influenced substantially by Ahara, Vihara and Dinacharya. Excessive nourishment, inappropriate dietary practices and inadequate physical activity may contribute to Santarpaṇajanya Vikara. The concept of Sthaulya which is described in Ayurveda as a disorder associated with excessive accumulation of Meda is also included under Santarpaṇajanya vikara. Adhyasana, Avyayama and Divasvapna like lifestyle factors also plays role in early menarche.

Impact of ahara in menarche

In *Ayurveda classics* has been also described that *"Aaharsambhava Vastu Rogashcha Aaharsambhava"* means growth and development of our body depends on our *Aahara* (diet) and *Rogashch* (also depends on diet.[3]

Acharya charaka mentioned in ashtoundhithiya adhaya athi guru, madura, snighdha ahara sevana leads to kapha medo vriddhi leading to sthoulya.[4]

Excessive intake / excessive nourishment ,carbohydrate-rich food with preservatives like propionate especially found in breads, baked foods leads to adiposity and weight gain.[5] Leptin secreted in the adipose tissue is also involved in pubertal changes and menarche. The relationship between adiposity and pubertal timing is better supported than the relationship between digital media and menarche.[6] A systematic review and meta-analysis of cohort studies reported that obese girls had greater risk of early puberty compared with normal-weight girls.[7] The article similarly discusses childhood obesity as a risk context for early menarche and attributes possible mechanisms to adipose-tissue aromatization and leptin-related signalling.

Increased adiposity → altered insulin/leptin and gonadal-axis signalling → altered pubertal timing.

School timings and ahara

The dietary habits of children are often irregular and largely influenced by school timings, which may result in skipping either breakfast or lunch. Such irregular and inadequate dietary intake may be considered under the concept of *Pramitasana*,[8] which can contribute to *Vata Prakopa*. In addition, increased consumption of fried, spicy, and *uṣṇa* foods may contribute to *Pitta Prakopa*. The concomitant aggravation of *Vata* and *Pitta* may result in an increase in *Uṣṇa Guṇa* within the body, thereby enhancing the *Agneya Guṇa and akalapravarthi*. This may subsequently influence the physiological processes involved in *Artava Janana*.

Digital Media and Sleep Wake Disturbance

Night-time digital-media use is particularly relevant because the timing of exposure may affect sleep. A systematic review of adolescents found that excessive digital screen use was associated with poorer and shorter sleep, with night time mobile phone use associated with poor sleep quality.[9] Thus, a plausible behavioural sequence is: late-night screen exposure → delayed bedtime → later waking → reduced opportunity for morning outdoor activity → lower physical-activity exposure and greater daytime sedentary time. Reduced outdoor activity can reduce opportunities for cutaneous vitamin-D synthesis. Vitamin D has biological relevance to reproductive and endocrine tissues. A systematic meta-analysis of six studies including 3016 precocious puberty patients and 8296 healthy individuals showed that vitamin-D-deficient subjects were more likely to develop precocious puberty. Recently, found that a low serum 25(OH)D level is an independent risk factor for idiopathic central precocious puberty, and several characteristics of females with precocious puberty could be affected by their vitamin D status.[10]

Vitamin D deficiency/insufficiency → altered VDR-mediated signalling and possible dysregulation of the HPG axis → changes in GnRH neuronal activity → altered LH and FSH secretion → ovarian steroidogenesis and estrogen signalling → possible early development of secondary sexual characteristics and menarche.[11] Further, more studies are needed to determine how vitamin D status itself influences progression of puberty or how certain VDR polymorphisms affect the age of menarche.

Insulin Resistance and Puberty

Insulin resistance and type 2 diabetes-related metabolic dysfunction may be relevant to particularly in adolescents with excess adiposity. However, "juvenile diabetes" generally refers to type 1 diabetes mellitus and should not be incorporated into the model as a cause of early menarche.

Type 2 diabetes mellitus is a metabolic disorder characterized by peripheral insulin resistance, leading to hyperglycemia. Once considered a predominantly adult disease, it has become a pressing concern in the field of pediatrics due to its rising incidence, mainly attributable to lifestyle factors and childhood obesity. Girls are more affected than boys.[12] In addition, hormonal changes at puberty result in temporary insulin resistance, leading to hyperglycemia and the risk of developing Type two diabetes.

Involvement of Manasika Guṇas in Precocious Puberty: An Ayurvedic Perspective

In Ayurveda, Sattva, Rajas and Tamas are described as the three fundamental Manasika Guṇas that influence mental functioning, perception, behaviour and emotional responses. Sattva is associated with clarity, stability and discernment; Rajas with activity, desire and stimulation; and Tamas with inertia, obscuration and reduced awareness. Pubertal onset is primarily regulated by the hypothalamic–pituitary–gonadal axis and may be influenced by genetic, nutritional, metabolic and environmental factors. The Manasika Guṇas are therefore best used as an interpretive framework for mental wellbeing rather than as a substitute for established endocrine mechanisms.[13]

1. Excess Rajas: Overstimulation And Heightened Reactivity

Rajas is associated with activity, movement, ambition, desire and mental restlessness. When discussing childhood development, a Rajasic predominance may be considered a conceptual description of excessive stimulation, difficulty regulating impulses and heightened responsiveness to external experiences.

Premature curiosity about adult themes: Repeated exposure to age-inappropriate sexual content, adult conversations or highly sexualised media may influence a child's curiosity, vocabulary and understanding of relationships. From an Ayurvedic interpretive perspective, this may be discussed in relation to sensory stimulation and Rajasic tendencies.

2. Excess Tamas: Reduced Awareness And Impaired Discernment

Tamas is traditionally associated with inertia, heaviness, obscuration and diminished clarity of perception. In an interpretive discussion of childhood wellbeing, Tamasic tendencies may be considered in relation to reduced awareness, passive behavioural patterns and difficulties in making appropriate judgements. These characteristics should not be regarded as diagnostic features of precocious puberty.

Lethargy and reduced engagement: Some children may show low motivation, reduced participation in age-appropriate activities or increased sedentary behaviour. Such features can be explored through the Ayurvedic concept of Tamas, but they may also reflect sleep deprivation, emotional distress, nutritional problems or other health concerns.

Poor sleep hygiene and sedentary habits: Irregular sleep schedules, prolonged screen exposure and limited physical activity can adversely affect general health and emotional wellbeing. Although these behaviours may be discussed using the concepts of Tamas and lifestyle imbalance, their relationship with pubertal timing is complex and cannot be established from these concepts alone.

Future implications of early menarche

1. Reduced Adult Height

Early pubertal development may initially produce accelerated linear growth, making affected girls appear taller than their age-matched peers. However, increased exposure to sex steroids, particularly oestrogen, accelerates skeletal maturation and the closure of the epiphyseal growth plates. Consequently, the period available for further height gain may be shortened, potentially resulting in a lower adult height than would otherwise have been achieved.

2. Psychological, Emotional And Social Consequences

Girls who experience menstruation substantially earlier than their peers may face difficulties adapting to physical and emotional changes before they have developed the maturity or knowledge needed to understand them. Visible changes in body shape, breast development and the onset of menstruation can contribute to embarrassment, body dissatisfaction and reduced self-confidence.

Early maturation may also expose girls to unwanted attention, bullying, social exclusion or sexual harassment. The mismatch between physical appearance and emotional maturity may

increase vulnerability to psychological distress. Some studies have reported associations between earlier pubertal timing and depressive symptoms, anxiety, risk-taking behaviours and adverse social experiences.

3. Long-Term Metabolic and Cardiovascular Implications

Early menarche has been associated with a higher prevalence of obesity, insulin resistance, type 2 diabetes mellitus, metabolic syndrome and hypertension in adulthood. A major umbrella review by Lee et al. (2022), which included 13 systematic reviews covering more than 6.8 million participants, reported associations between early menarche and several metabolic outcomes. The pooled adjusted relative risks were 1.68 for obesity, 1.56 for metabolic syndrome, 1.30 for type 2 diabetes or impaired glucose tolerance, and 1.24 for hypertension.[14]

Gynaecological disorders and reproductive health

Early menarche has been investigated as a possible risk marker for certain reproductive disorders. In the umbrella review by Lee et al. (2022), early menarche was associated with endometriosis, with a pooled adjusted relative risk of 1.22.[15]

Several mechanisms have been proposed. Earlier menarche may increase the duration of exposure to cyclic ovarian hormones and menstrual activity across the reproductive lifespan. However, the relationship between early menarche and an individual gynaecological disorder depends on multiple biological, genetic and environmental influences.

DISCUSSION

The age at menarche is a multifactorial phenomenon influenced by genetic predisposition, nutritional status, body composition, metabolic health, physical activity, sleep patterns and environmental factors. The increasing prevalence of childhood obesity, sedentary behaviour, irregular dietary habits and sleep disturbances in contemporary society highlights the importance of examining lifestyle-related influences on pubertal timing. The present discussion integrates these contemporary observations with Ayurvedic concepts of *Āhāra, Vihāra, Santarpaṇa, Medovṛddhi* and *Sthaulya* to develop a holistic perspective on early menarche.

From the Ayurvedic perspective, *Āhāra* is fundamental to the growth, nourishment and maintenance of health. The classical principle *"Āhārasambhavaṃ Vastu Rogāśca*

Āhārasambhavāḥ" emphasizes the role of diet in both physiological development and the manifestation of disease. Acharya Charaka, in the *Aṣṭau Ninditīya Adhyāya*, describes the consequences of excessive consumption of *guru, madhura* and *snigdha āhāra*, which may contribute to *Kapha* and *Meda Vṛddhi* and the development of *Sthaulya*. In the contemporary context, frequent consumption of energy-dense foods, refined carbohydrates and highly processed foods may promote excess adiposity when energy intake consistently exceeds expenditure. Increased adiposity is associated with altered leptin, insulin and reproductive-axis signalling, providing a plausible physiological link between nutritional status and pubertal timing. Nevertheless, the classical concepts provide an interpretive framework and should not be considered direct evidence that specific *Santarpanajanya Vikara* cause early menarche.

Dietary practices associated with school schedules, including breakfast skipping, irregular meal timings and dependence on readily available processed foods, may influence overall nutritional adequacy and metabolic health. Although these practices can be discussed in relation to *Pramitasana* and the Ayurvedic principles of *Doṣa* balance, their individual effects on menarche require further investigation. Similarly, the proposed relationship between increased *Uṣṇa* and *Agneya Guṇa* and earlier *Artava Pravṛtti* represents a theoretical Ayurvedic interpretation rather than an established causal mechanism.

Contemporary *Vihāra* patterns, particularly prolonged sedentary behaviour, late-night digital-media use and irregular sleep–wake schedules, are additional considerations in adolescent health. Excessive screen exposure may delay bedtime and reduce sleep duration, while sedentary routines may limit opportunities for physical activity and outdoor exposure. These behaviours can influence general metabolic and psychological wellbeing. Although inadequate outdoor exposure may contribute to vitamin D insufficiency, the evidence linking vitamin D status directly to the onset and progression of puberty remains inconclusive. Therefore, the proposed sequence involving screen exposure, reduced outdoor activity, vitamin D deficiency and early menarche should be interpreted cautiously rather than as a proven causal pathway. The concepts of *Sattva, Rajas* and *Tamas* offer an additional framework for discussing emotional wellbeing, behavioural patterns and the influence of environmental stimulation during childhood. Excessive exposure to age-inappropriate sexualised content may affect a child's understanding of sexuality and relationships; however, such exposure should not be equated with the biological initiation of puberty. Likewise, sedentary behaviour, lethargy and poor sleep may be interpreted through the concept of *Tamas*, while heightened stimulation and

restlessness may be discussed in relation to *Rajas*. These associations are conceptual and should not be used as diagnostic criteria or as substitutes for established endocrine mechanisms. The clinical significance of early menarche extends beyond the timing of the first menstrual period. Earlier pubertal maturation may be associated with accelerated skeletal development and earlier epiphyseal closure, potentially affecting adult height. Psychosocial concerns may include body-image difficulties, anxiety, emotional distress and challenges in adapting to menstruation before adequate psychological preparation. Epidemiological evidence also suggests associations between early menarche and certain long-term metabolic, cardiovascular and gynaecological outcomes. However, these relationships are influenced by several interacting factors, and early menarche should be regarded as a potential risk marker rather than a direct cause of every associated disorder.

Overall, integrating Ayurvedic principles with contemporary biomedical evidence may help frame preventive approaches that emphasise balanced nutrition, regular physical activity, adequate sleep, healthy digital-media habits and emotional support. Such an approach is consistent with the broader Ayurvedic emphasis on appropriate *Āhāra* and *Vihāra*. Future research should investigate whether these classical concepts can be operationalised into measurable clinical variables and evaluated alongside established determinants of pubertal timing. Prospective studies are particularly needed to distinguish associations from causal relationships and to establish the relevance of specific dietary and lifestyle factors to the age at menarche.

Although a direct reference to early menarche is not explicitly described in the classical Ayurvedic texts, Acharya Kāśyapa emphasized that *Prathama Rajodarśana* (the first occurrence of menstruation) is influenced by *Āhāra Viśeṣa* (specific dietary factors) and *Ārogya Viśeṣa* (the individual's health status). He also highlighted the importance of attaining *Sampūrṇa Dhātu Avasthā*,[16] indicating adequate development and maturity of the body tissues, for the onset of menarche. These concepts suggest that the timing of menarche may be associated with nutritional status, overall health, and the degree of physiological maturation of an individual. From this perspective, variations in dietary patterns and health status during childhood may be considered relevant factors when exploring the phenomenon of early menarche. However, these classical concepts provide a theoretical framework for understanding pubertal timing rather than direct evidence that specific dietary factors cause precocious puberty.

CONCLUSION

Contemporary changes in *Ahara* and *Vihara*, including excessive calorie-dense food intake, irregular dietary patterns, reduced physical activity, prolonged digital-media exposure and disturbed sleep–wake cycles, may influence adolescent health and pubertal timing. From an Ayurvedic perspective, these factors can be interpreted through the concepts of *Santarpaṇa, Medovṛddhi, Sthaulya*, *Pramitasana* and *Doṣa Prakopa*. The interaction of dietary and lifestyle factors may consequently influence the physiological processes associated with *Artava Janana*.

Thus, appropriate *Ahara*, *Vihara* and *Dinacarya*, together with adequate physical activity, regulated sleep and healthy dietary practices, have relevance in promoting healthy adolescent development. The Ayurvedic framework may provide a holistic perspective for understanding contemporary lifestyle influences on menarche; however, further clinical and longitudinal studies are required to establish the specific relationship between these Ayurvedic concepts and age at menarche.

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