WJPMR, 2026, 12(6), 130-132

Review Article

WORLD JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.wjpmr.com

Impact Factor: 7.533

ISSN (O): 2455-3301

ISSN (P): 3051-2557

Coden USA: WJPMBB

DELAYED PUBERTY AND AYURVEDA: A LITERARY REVIEW

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DOI: https://doi.org/10.5281/zenodo.20455043

How to cite this Article: [*1]Dr. Kokare Abhishek Dilip, [2]Dr. Kulkarni Anuja Abhaykumar (2026). Delayed Puberty And Ayurveda: A Literary Review. World Journal of Pharmaceutical and Medical Research, 12(6), XXX–XXX.

Article Received on 30/04/2026 **Article Revised on 21/05/2026** **Article Published on 01/06/2026**

ABSTRACT

Delayed puberty is defined as the absence of secondary sexual characteristics beyond the expected age of onset: no breast development by 13 years in girls and no testicular enlargement by 14 years in boys.[1] It affects approximately 2% of adolescents and can result from constitutional delay, chronic systemic disease, nutritional deficiency, endocrine disorders, or primary gonadal failure.[1] Ayurveda does not describe delayed puberty as a single disease entity, but the condition can be understood through concepts such as Dhatu Kshaya, Artava Kshaya, Shukra Kshaya, Agnimandya, and Beejadosha. Classical Ayurvedic literature emphasizes proper nourishment of Rasa through Shukra Dhatu, balanced Vata, and healthy endocrine-equivalent regulation for timely sexual maturation. This literary review integrates modern endocrinology and Ayurvedic principles to provide a comprehensive understanding of delayed puberty and its holistic management.

KEYWORDS: Dhatu Kshaya, Artava Kshaya, Shukra Kshaya, Agnimandya, and Beejadosha.

INTRODUCTION

Puberty is a complex developmental phase characterized by activation of the hypothalamic–pituitary–gonadal (HPG) axis, resulting in gonadal steroid secretion and the development of secondary sexual characteristics.[2] In girls, thelarche is the earliest sign; in boys, testicular volume of at least 4 mL indicates pubertal onset.[1] Delayed puberty is diagnosed when these milestones are absent at ages more than two standard deviations above the population mean.[1]

The psychosocial impact of delayed puberty can be substantial, including low self-esteem, anxiety, and social withdrawal.[3] While modern medicine focuses on endocrine evaluation and hormone replacement where indicated, Ayurveda offers a broader perspective by addressing nutrition, tissue development, digestive capacity, and constitutional balance. This review explores the correlation between delayed puberty and Ayurvedic concepts, and summarizes therapeutic approaches described in classical and contemporary Ayurvedic literature.

Modern Perspective on Delayed Puberty

Delayed puberty may be categorized into four broad groups: constitutional delay of growth and puberty (CDGP), functional hypogonadotropic hypogonadism, permanent hypogonadotropic hypogonadism, and hypergonadotropic hypogonadism.[1] CDGP is the most common cause and is often familial, representing a normal variant of maturation.[4]

Functional hypogonadotropic hypogonadism may occur due to malnutrition, chronic kidney disease, inflammatory bowel disease, hypothyroidism, or excessive exercise.[1] Permanent causes include Kallmann syndrome, pituitary lesions, Turner syndrome, and Klinefelter syndrome.[1]

Clinical features in girls include absent breast development, primary amenorrhea, and poor growth velocity. In boys, there may be absence of testicular enlargement, scant facial hair, and delayed growth spurt.[1] Evaluation includes detailed history, anthropometry, Tanner staging, bone age assessment, serum LH, FSH, testosterone or estradiol, thyroid profile, prolactin, and selective genetic testing.[1]

Management depends on etiology. CDGP may require reassurance or short-term low-dose sex steroids to initiate puberty. Permanent hypogonadism requires long-term hormone replacement.[5] Nutritional optimization

and treatment of underlying systemic illness are essential in functional causes.

Ayurvedic Conceptualization

Ayurveda considers adolescence (Yauvana) as a phase marked by maturation of Dhatus and expression of reproductive capacity.[6] Charaka describes Shukra as the final and most refined Dhatu, produced sequentially from Rasa, Rakta, Mamsa, Meda, Asthi, and Majja.[7] Disturbance in any preceding Dhatu can impair Shukra formation and delay reproductive development.

Delayed puberty can be interpreted through the following concepts.

1. Dhatu Kshaya – inadequate nourishment of tissues due to chronic malnutrition or Agnimandya.
2. Shukra Kshaya – deficiency or delayed development of reproductive tissue.
3. Artava Kshaya – reduced or delayed menstrual function in females.[8]
4. Vata Prakopa – especially Apana Vata dysfunction, affecting sexual maturation and menstruation.
5. Beejadosha – congenital or genetic abnormalities.[7]
6. Sahaja Vikara – hereditary disorders present from birth.

Kashyapa Samhita, the principal pediatric text, emphasizes proper nutrition, Bala (strength), and developmental milestones, providing a conceptual basis for management of delayed growth and maturation.[9]

Samprapti (Pathogenesis)

The probable Ayurvedic pathogenesis begins with Nidanas such as Alpa Ahara (inadequate nutrition), Ruksha Ahara, chronic illness, psychological stress, overexertion, and congenital defects. These factors impair Jatharagni and Dhatvagni, leading to deficient formation of Rasa Dhatu. As nutrition fails to adequately nourish subsequent Dhatus, Majja and Shukra remain underdeveloped.[10]

Vata Dosha, particularly Apana Vata, becomes aggravated and disrupts normal reproductive functions. In girls this may manifest as delayed menarche, while in boys there is delayed virilization. Pitta, which governs transformation and hormonal activity, may also be insufficient, resulting in reduced metabolic conversion necessary for puberty.

Thus, the core pathogenesis involves Agnimandya → Rasa Kshaya → Uttarottara Dhatu Kshaya → Shukra/Artava Kshaya → Yauvana Vilamba (delayed sexual maturation).

Nidana (Etiological Factors)

Ayurvedic etiological factors correlate well with modern causes of delayed puberty.

- Alpashana and Karshya (undernutrition) – analogous to malnutrition and low body mass index.
- Chira Roga (chronic disease) – chronic kidney, liver, inflammatory, and endocrine disorders.
- Manasika Nidana – stress, anxiety, and depression.
- Ati Vyayama – excessive exercise causing hypothalamic suppression.
- Beejadosha – chromosomal and genetic abnormalities.
- Ksheena Bala and Ojas Kshaya – chronic debility and poor immunity.[6,7]

Clinical Correlation

In females, delayed puberty can resemble Artava Kshaya, characterized by delayed or scant menstruation and underdevelopment of secondary sexual features.[8] In males, the condition correlates with Shukra Kshaya, described as reduced reproductive potency, delayed semen formation, and diminished masculine characteristics.[7]

Associated Ayurvedic features may include.

- Karshya (low body weight)
- Daurbalya (weakness)
- Alpa Meda and Mamsa
- Mandagni
- Vata dominance
- Chinta and Nidranasha

Ayurvedic Management Principles

Treatment is individualized according to Dosha, Dhatu, Agni, and Bala. The principal goals are.

1. Deepana and Pachana to improve digestive and tissue metabolism.
2. Brimhana to enhance nutrition and growth.
3. Rasayana to strengthen Ojas and endocrine function.
4. Vajikarana to promote Shukra and reproductive maturation.
5. Satvavajaya to reduce psychological stress.[6]

Internal Medicines

Commonly used Ayurvedic formulations include:

Ashwagandha (Withania somnifera): A potent Rasayana and adaptogen that improves body weight, stress tolerance, and serum testosterone in some studies.[11]

Shatavari (Asparagus racemosus): Nourishes Rasa and Artava, useful in delayed menarche and female reproductive insufficiency.[12]

Guduchi (Tinospora cordifolia): Enhances immunity and supports chronic illness recovery.[6]

Vidarikanda (Pueraria tuberosa): Brimhana and Balya, useful in undernourished adolescents.[6]

Phala Ghrita: Traditionally indicated for female reproductive development and menstrual disorders.[8]

Ashwagandhadi Lehyam and Chyawanprasha: Improve nutrition, immunity, and tissue maturation.[6]

Suvarna preparations and Swarna Prashana may be considered by qualified physicians for debilitated children, with careful adherence to safety and regulatory standards.[9]

Panchakarma and Supportive Therapies

In selected patients with adequate strength, mild Panchakarma procedures may be used. Abhyanga with Bala Taila or Ksheerabala Taila helps reduce Vata and promotes tissue nourishment. Shirodhara and Nasya may be useful in stress-related hypothalamic dysfunction. Basti, particularly Matra Basti, supports Apana Vata regulation and reproductive health.[6]

Diet and Lifestyle

Ayurveda strongly emphasizes wholesome nutrition in adolescents. Recommended foods include milk, ghee, dates, black gram, sesame, almonds, and whole grains. These are rich in proteins, healthy fats, calcium, iron, and micronutrients essential for pubertal development.[13]

Adequate sleep, avoidance of overtraining, stress reduction, and regular moderate exercise are important. Yoga practices such as Baddha Konasana, Bhujangasana, and Nadi Shodhana Pranayama may improve neuroendocrine balance and mental well-being.

Evidence Base

Emerging research supports several Ayurvedic herbs in conditions related to delayed puberty. Ashwagandha has demonstrated stress reduction and improvement in endocrine parameters.[11] Shatavari shows phytoestrogenic and reproductive supportive properties.[12] Nutritional Rasayana therapies may benefit adolescents with constitutional delay and low body mass, although large randomized controlled trials specifically in delayed puberty are limited. Therefore, Ayurvedic interventions should be used as complementary strategies alongside modern diagnostic evaluation and monitoring.

DISCUSSION

Delayed puberty is often a manifestation of inadequate nutritional reserve, chronic disease, or endocrine dysfunction. The Ayurvedic framework offers a systems-based interpretation centered on Agni, Dhatu nourishment, and Vata regulation. This perspective aligns closely with modern observations that chronic undernutrition and stress can suppress the HPG axis.

Ayurvedic management is particularly valuable in constitutional delay of growth and puberty, where reassurance, nutrition, stress reduction, and gentle anabolic therapies can improve overall health and support natural maturation. However, conditions such as Turner syndrome, Klinefelter syndrome, pituitary tumors, and permanent hypogonadism require specialist endocrine care and, often, hormone replacement. Integrative management should therefore be collaborative and evidence-informed.

CONCLUSION

Delayed puberty is a multifactorial condition with significant physical and psychological implications. Modern medicine provides robust diagnostic tools and targeted treatment, while Ayurveda contributes a holistic framework emphasizing Agni, Dhatu Poshana, Rasayana, and Vajikarana. Delayed puberty may be correlated with Dhatu Kshaya, Shukra Kshaya, Artava Kshaya, and Apana Vata dysfunction. When appropriately integrated with modern endocrinology, Ayurvedic interventions may improve nutrition, resilience, and reproductive maturation, especially in constitutional and functional cases.

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