

PRIMARY TOOTH ERUPTION - AN AYURVEDIC OVERVIEW

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ABSTRACT

Teething is the process by which an infant's first teeth, the deciduous teeth sequentially appear by emerging through the gums, typically arriving in pairs¹. It is an important landmark in assessing the growth and development of a child. Though there have been many references regarding dental care and dental disorders in *Ayurveda*, paediatric dentistry is an area which is poorly dealt with. *Kashyapasamhitha*, the authentic Ayurvedic classical book in paediatrics incorporates a separate chapter – *Danthajanmikam adhyayam* which deals with primary tooth eruption and its various aspects like types of tooth eruption, factors influencing tooth eruption, variations and disorders of eruption, period of tooth eruption and its effects etc. *Vagbhata* has dealt mainly the complications arising during dentition and how to mitigate them safely and effectively. An attempt has been made to combine various references about primary tooth eruption from classical Ayurvedic text books and to re-interpret them in the light of modern scientific studies and knowledge.

Keywords: *Ayurveda*, Paediatric, *Dantajanma*, tooth eruption, *Danta*

INTRODUCTION

Ayurveda has included dentistry in *Salakya tantra*, one among the *Ashtangas*. Oral care has been given much importance in *Ayurveda*. Rules of brushing teeth (*Dantadhavan*), tongue scrapping (*Jihwa nirlekhanam*) and other oral cleansing measures are included in the daily regimen practices. Diseases of tooth and gums are explained with their pathology and clinical manifestations. Treatment has been indicated specifically for each disease. All classics of *Ayurveda* have accepted number of teeth along with their sockets as thirty-two. As per *Kashyapa Samhita*, the authentic Ayurvedic paediatric textbook, out of these, eight erupt once (*Sakrijjatha*) and the rest erupt twice (*dwija*). The central incisors are called *Rajadanta*, lateral incisors as *Bastadanta*, canines are called as *Damshtra* and the rest which grow in original roots are called *Hanavya*². In what so ever month teeth erupt after birth, shedding occurs in the corresponding year of life. Primary dentition is comprised of 20 teeth, which exfoliates as the primary teeth erupt. For Primary dentition, in each arch of mouth, there are two central

incisors, two lateral incisors, two canines and four molars (no premolars and third molars).

Paediatric dentistry in *Ayurveda* is an area which is least appraised. Teething is considered as an index of growth and development of children. Time of eruption and health of teeth indicates the level of maturity of *asthidhathu* in children. Variations or disorders in these can be a sign of any underlying pathology. *Kashyapa Samhitha*, the authentic paediatric text in *Ayurveda* has given characteristics of ideal teeth and also has explained time and mode of eruption of ideal teeth in chapter *Danthajanmikamadhyayam*. Disorders of tooth eruption and unhealthy characteristics of teeth are also narrated. These are on par with that of modern dentistry. Safe and effective methods can be adopted from *Ayurveda* to relieve teething disorders and to speed up the teething process. Ayurvedic medicines can be successfully applied in dentistry as antiseptic, antioxidants, and analgesic.

Physiology of tooth formation and eruption:

Danta is considered as the *upadhatu* of *Asthi dhatu*. It has predominance of *Prithvi* and *vayumahabhuta*³ and contributes for the stoutness and rigidity of tooth. *Caraka* has included teeth among the body parts which grow after birth⁴. Classics have accepted number of teeth along with their sockets as thirty two^{5,6,7}. The *Dasanas* or *Dantas* are considered as *Ruchakasthi*, one among the type of *Asthi*'s⁸.

The teeth develop from ectoderm and mesoderm. The development is in four continuous stages - initiation stage, bud stage, cap stage, bell stage and then maturation. In the initiation stage the dental lamina connects the developing tooth bud to the epithelial layer of mouth. During the Bell stage, localized proliferation of cells in the dental laminae forms round or oval swellings, the tooth buds, which grow into the mesenchyme. In the cap stage, the deep surface of each ectodermal tooth bud becomes invaginated by mesenchyme called the dental papilla, which gives rise to the dentin and dental pulp. The ectodermal, cap-shaped covering over the papilla is called an enamel organ as it produces the future enamel of the tooth. Hard tissues, including enamel and dentin, develop during the next stage of tooth development i.e. the crown, or maturation stage⁹.

Tooth eruption is described as the movement of a tooth, primarily in the axial direction, from its site of development in the jaw bone to its functional position in the oral cavity. As per *Ayurveda*, ideally tooth eruption should

begin in the eighth month of life¹⁰. The *dhathus* which are involved in the eruption of teeth are *Asthi* and *Majja*¹¹. The *dhathus* get localised in the root of gums and along with *doshas* results in tooth eruption. The *Dhatubija* or tooth buds consists of localised proliferation of cells in the dental lamina. These buds grow into mesenchyme and develop into primary teeth. As per various studies, on an average, the eruption of primary teeth begins at about the age of 8 months with the mandibular central incisors, and ends at the age of about 30 months with the maxillary second molars. Thus, in most children the total period of eruption of primary teeth extends for about 2 years. The eruption phase has been classified into the following stages: pre-eruptive; intraosseous; mucosal penetration; pre-occlusal; and post-occlusal. In the pre-eruptive stage, the tooth crown is formed and the position of the tooth within the jaw bone is relatively stable. In the intraosseous stage the root begins to form and the tooth starts by much slower movement, moving inside the jaw bone towards the oral cavity. The *mucosal penetration stage* occurs, in general, when half to three-fourths of the root of the erupting tooth has been formed. The *pre-occlusal stage* is relatively short, whereas the *post-occlusal stage* is much longer and it is characterized by much slower tooth movement. Although the movement of teeth during eruption primarily occurs in the axial direction, the teeth actually move in all the three planes of space¹².

Table 1: Primary tooth eruption and period of eruption¹³

Upper	Erupts by
Central incisor	8-12 months
Lateral incisor	9-13 months
Canine	16-22 months
First molar	13-19 months
Second molar	25-33 months

Lower	Erupts by
Central incisor	6-10 months
Lateral incisor	10-16 months
Canine	17-23 months
First molar	14-18 months
Second molar	23-31 months

Complications of early teeth eruption:

As per *Ayurveda*, ideally tooth erupts by 8th month. When eruption occurs prior to this, there can be various complications.

4th month- Teeth will be of less strength and can lead to early decay and various other diseases.

5th month- Teeth will be shaky, increased sensitivity and can lead to various other diseases.

6th month- Teeth will be inverted, covered with plaques, discoloured and can be easily afflicted with dental caries. 7th month- Teeth will be having two pockets, split, broken, stripped, dry, irregular and protruberant¹⁴.

These complications can be due to immaturity of *dhathus* involved in tooth formation and eruption. Studies have failed to point out any specific cause for premature eruption of teeth. However few endocrine or genetic

factors may be involved in it as in congenital adrenal hyperplasia.

Factors influencing tooth eruption:

Physiological variation in the normal eruption of teeth is a common finding, but in case of significant deviation, evaluation of health and development of child should be done. *Kashyapa* has mentioned few factors like *Lingabhedha* (Gender difference), *Jaathivisesha* (Racial difference), *Mathapithroranukaranam* (Genetic and hereditary factors), *swabhavam* (Natural or other unknown causes), *Swakarmavishesham* (Nutrition of the child) etc which normally influence primary tooth development and eruption in children.

Gender – As per Ayurvedic classics, appearance of teeth in female babies are early and cause less trouble while in males it takes much time and causes difficulties due to compactness of teeth and stable nature of gums¹⁵. Studies conducted on tooth eruption also prove this¹⁶. The difference in eruption times between both genders on average is from 4 to 6 months, largest difference being for permanent canines. This is attributed to early onset of maturation in females.

Racial – Difference in time of tooth eruption exists among different races (*Jathi visesha*). Teeth emerge considerably earlier in African and American-African children than in Asians and Caucasians¹⁷.

Genetic – Genetic factors are proved to have effect in emergence of teeth by analysing the concordance rate among monozygotic and dizygotic twins¹⁸.

Natural causes-There can be some natural or unknown factors which determines the time of teeth eruption in children.

Nutritional factor- There is evidence that chronic malnutrition extending beyond the early childhood is associated with delayed teeth eruption¹⁹. It has been found that children from higher socioeconomic backgrounds have earlier tooth emergence than children from lower socioeconomic classes as children from higher socioeconomic class get better health care, nutrition and these factors influence earlier development of dentition.

Others- Other factors like craniofacial morphology, hormonal factors and various systemic and genetic factors influence the time and mode of teeth eruption.

Ideal teeth characteristics

According to *Ayurveda*, teeth which erupt in eighth month possess ideal qualities²⁰ and are an indication of longevity²¹. Completeness, evenness, compactness, whiteness, unctuousness, smoothness, cleanliness, disease-free state and slight protuberance of upper row of

teeth are characteristics of good teeth. Ideal teeth should be supported with gums which are even, red, compact, unctuous and with big, compact, stable roots. Studies have shown that appearance of lips, appearance of dental arches, shape of teeth, teeth colour and appearance of gums contribute to the aesthetics of teeth and surrounding structures²².

The following four major tissues make up a healthy tooth – enamel, dentin, cementum, and dental pulp.

Enamel- It is the hardest and the most highly mineralised substance of human body. 96% of enamel comprises of mineral, with water and organic material composing the rest. Its normal colour varies from light yellow to greyish white. **Dentin**- It is the porous and yellow hued material, which works as a protective layer and supports the crown of tooth. Dentin is a mineralized connective tissue with an organic matrix of collagenous proteins. **Cementum**- It is a specialised bone like substance wrapping the root of tooth. It is yellowish and softer than dentin and enamel. **Dental pulp** – It is the central part of the tooth filled with soft connective tissue. Dental pulp encloses blood vessels and nerves that enter the tooth from a hole at the apex of the root²³. Ideal characteristics of these tissues indicate the maturity and health of *Asthi* and *Majja dhathus*.

Symptoms associated with tooth eruption and their management: Tooth eruption takes place during an 8-day window that includes 4 days before tooth eruption, the day of eruption and the 3 subsequent days. Mostly, the primary teeth pierce the gums without causing any symptoms. Systemic and local signs and symptoms ascribed to primary tooth eruption include general irritability, sleep disturbances, crying, fussiness, rhinorrhea, facial flushing, fever, diarrhoea, loss of appetite, drooling, ear rubbing on the side of the erupting tooth, inflammation of the gums overlying the tooth, gum irritation, and increased biting. Though there has been some association between tooth eruption and these symptoms, studies have failed to trace out any causal relationship²⁴. During teething, *Asthi* and *Majja dhathus* located in the both jaws gets mature and undergoes ripening. This leads to slight swelling in the gums. Rubbing between both gums results in horripilations to the child. Presence of *Kapha* causes itching and the child gets tendency to take every object to mouth for relief. Also there will be changes in feeding habits and digestive disturbances. Child bites nipples of mother while feeding and when it gets devoid of food, child yawns. This may lead to vitiation of *vata*. *Vata* along with *kapha* gets localised in *dantasayas* and

then moves all over body along with *pitha*. This results in various secondary diseases to the child by vitiating other *dhatu*s and *malas*²⁵. *Vagbhata* has mentioned teeth eruption as the cause for systemic and local diseases like fever (*jwara*), diarrhoea (*vitbhedha*), cough (*kasa*), vomiting (*chhardi*), headache (*siroruja*), various ocular (*Abhishyanda* and *pothaki*) and skin manifestations (*visarpa*). *Vagbhata* has explained *Kukunaka*, an inflammatory disease of eye to be the secondary complication of *dantopathi*²⁶. He has stated that the diseases are self limiting and subsides when the eruption is completed²⁷, but mild measures can be opted to ease out the situation. Gums can be rubbed with powdered drugs like *Pippali*, flower of *Dhataki* and *Dhathri* by mixing with honey. Powder of dried meat of certain birds like *lava*, *tittiri* mixed with honey can also be used for this purpose. Studies have proved that light massage or rubbing over gums with clean fingers or very soft finger toothbrush for 1-2 minutes are good teething remedies as it reduces the swelling and thickness of gums²⁸. Ghee formulations like *Vachadi* and *Samangadi Ghritha* can be used in general to lessen difficulties arising during teething²⁹. For managing the secondary manifestations associated with teething, symptomatic treatment should be adopted considering the vitiated dosha, origin and stage of disease, time, place etc. Only Ashtanga Samgraha has mentioned specific treatment for each complication arising during teething.

Treatment of fever of vata origin- Child should be made to drink syrup prepared from *bhadradaru* (*Cedrus deodara*), *Ghana* (*Cyperus rotundus*), *yashti* (*Glycerrhiza glabra*) and *samanga* (*Rubia cordifolia*) with sugar candy.

Decoction or ghee prepared with drugs like *Surahwa* (*Cedrus deodara*), *Ghana* (*Cyperus rotundus*), *yashti* (*Glycerrhiza glabra*) etc can be used for oral intake or for anointing.

Oil prepared with *Haridra* (*Curcuma longa*), *ku-shta* (*Saussurea lappa*), *vacha* (*Acorus calamus*) etc can be used for massaging.

Treatment of fever, diarrhoea, vomiting and thirst- powder of parched paddy, *neelotpala* (*Nymphaea stellata*), *kana* (*Piper chaba*), *madhuka* (*Glycerrhiza glabra*), *anjana* (extract of *Berberis aristata*) with sugar and honey can be given fever of *pitta* origin and diarrhoea.

Decoction of parched paddy, *pippali* (*piper longum*), *gajapippali* (*piper chaba*) with sugar and honey cures fever, diarrhoea, thirst and vomiting.

In diarrhoea associated with *ama* and diarrhoea with blood, powder of *gajapippali* (*piper chaba*) or *devadaru* (*Cedrus deodara*) can be given with sugar.

Treatment of headache- Paste prepared with leaves of *Kapittha* (*Feronia limonia*), *Changer* (*Oxalis corniculata*), *Badari* (*Prunus domestica*) and *Kakamachi* (*Solanum nigrum*) mixed with ghee should be applied cold on head. This will relieve headache, vomiting and diarrhoea.

Treatment of eye diseases- For ocular manifestations like *kukunaka* and *pothaki*, specific treatment should be adopted. However, *vagbhata* has indicated to use pills made of *manassila* (Realger), *Sankhanabhi* (conch), *pippali* (*piper longum*), *madhuyashi* (*Glycerrhiza glabra*) mixed with honey generally in eye diseases of children.

Treatment of excessive thirst, diarrhoea, vomiting – powder of *priyangu* (*Callicarpa macrophylla*), *anjana* (extract of *Berberis aristata*) and *mustha* (*Cyperus rotundus*) should be consumed along with rice washed water.

Treatment of fever of kapha origin- Medicated ghee should be prepared with *Madhuka* (*Madhuka longifolia*), *vacha* (*Acorus calamus*), *vyosha* (*Piper longum*, *Zingiber officinalis* and *Piper nigrum*) etc, consumed with honey cures fever of *kapha* origin and acts as a best carminative.³⁰

Disorders and variations of tooth eruption:

Apart from ideal teething, *Kashyapa* has mentioned various disorders of eruption like:

Samudga- decrease in number of teeth due to continuous falling.

Samvrta- inauspicious and dirty

Vivrtta – worn-out, with excessive salivation, gets easily discoloured due to being uncovered and easily afflicted with diseases.

Kashyapa opines that birth with teeth or Natal teeth (*Sadantajanma*), eruption of upper teeth first (*Poorvamuttaradantajanma*), scattered teeth (*Viraladanta*), less teeth (*Heenadanta*), more number of teeth (*Adhikadanta*), terrible looking teeth (*Karaladanta*), discoloured teeth (*Vivarnadanta*) and cracked teeth (*Sphutithadanta*) are considered as variations from normal teething and are inauspicious³¹. These can be considered as signs of unhealthy maturation of body tissues and early indicators of developmental disorders in children.

Natal /neonatal teeth:

Children with high birth weight have been reported to have earlier eruption of their primary teeth than children with normal or low birth weights. Teeth present at birth

are known as natal teeth and those that erupt within the first month of life is known as neonatal teeth. Approximately one in 2000-3000 live births is so affected. The mandibular central incisor is the most common natal or neonatal tooth³². *Vagbhata* also suggests that birth with teeth and eruption of upper teeth first are not ideal and has suggested doing specific pacifications³³. Child born with teeth is considered to be due to excessive *sleshmala* diet by pregnant woman³⁴. Natal teeth or neonatal teeth tend to have abnormal roots. If the teeth are mobile there is probability of aspiration and should be extracted. Breastfeeding can be painful in natal or neonatal teeth³⁵. The mobility of the tooth frequently causes inflammation of the surrounding gingivae. Trauma to the ventral surface of the tongue may cause ulceration. Natal or neonatal teeth may be seen in association with syndromes like Pachyonychia congenita, Ellis-van Creveld syndrome, Hallermann-Streiff syndrome etc.

Delayed eruption

Delayed eruption of primary teeth may arise from either systemic or local factors. It may also be associated with prematurity or low birth weight. Delayed eruption of teeth is seen in association with Down syndrome and Turner's syndrome. Delayed eruption is seen in nutritional abnormalities and in endocrine disorders such as hypothyroidism or hypopituitarism

Variations in number of teeth:

Hypodontia is the term most often applied to a situation where a patient has missing teeth as a result of their failure of development or other systemic illness. Anodontia describes the total lack of teeth of one or both dentitions. Oligodontia is a term used to describe a situation where more than six teeth are missing. This may be Supernumerary teeth or excess numbers of teeth are most often located in the anterior maxilla in the midline, or immediately adjacent to the midline, and they are then referred to as a mesiodens. Supernumerary teeth in the molar regions adjacent or distal to the normal sequence of teeth are referred to as paramolars or distomolars respectively. Supernumerary teeth have significant association with invaginated teeth and cleft palate. Multiple supernumerary teeth are seen in cleidocranial dysplasia and in syndromes such as oral-facial-digital syndrome type 1, Gardner syndrome etc³⁶. These variations correlate with *Kashyapa's* concept of less number of teeth (*Heenadanta*), scattered teeth (*Viraladanta*) and more number of teeth (*Adhikadanta*) which are considered as signs of unhealthy dentition.

Variations in tooth morphology:

Kashyapa has described unideal morphological characters of teeth like terrible looking teeth (*Karaladanta*), discoloured teeth (*Vivarnadanta*) and cracked teeth (*Sphutithadanta*). Generally men have larger teeth than women. Racial differences have also been seen in size of tooth. Tooth size is defined as abnormal when dimensions have two standard deviations from average³⁷. Crown size: Teeth which are obviously larger than normal are referred to as megadont or macrodont and teeth which are smaller than normal are termed microdont. Generalized megadontia has been reported in connection with conditions like pituitary gigantism, unilateral facial hyperplasia and hereditary gingival fibromatosis. Microdontia can occur in association with hypodontia as in the example of X-linked hypohidrotic ectodermal dysplasia, where a heterozygous female might have one missing lateral incisor and a peg-shaped crown of the contralateral maxillary lateral incisor.

Root size: Larger than normal roots are most often seen affecting the maxillary central incisors. Short roots may also be seen in a number of conditions affecting the dentine and/or pulp and may be seen affecting the maxillary central incisors.

Invaginated teeth:

Des invaginus or invaginated teeth is a malformation of teeth most likely resulting from an infolding of the dental papilla during tooth development or invagination of all layers of the enamel organ in dental papillae.

Evaginated teeth:

It is the abnormal evagination of the internal enamel epithelium and dental papilla into the stellate reticulum. Evaginated teeth, or dens evaginatus, most commonly affect the premolar teeth.³⁸

Taurodontism:

It is a condition found in the molar teeth of humans whereby the body of the tooth and pulp chamber is enlarged vertically at the expense of the roots. As a result, the floor of the pulp and the furcation of the tooth is moved apically down the root.³⁹

CONCLUSION

Primary tooth eruption and various aspects associated with it are explained in *Ayurveda*. Disorders of tooth eruption and variations in primary tooth number and morphology explained in *Ayurveda* can be correlated with that explained in modern dentistry. Factors which influence tooth eruption as explained by *Kashyapa* are

relevant in present era also and have been proved by scientific studies. Symptoms associated with teething can be managed well with Ayurvedic measures and also helps in speeding up the teething process. Scientific validation of Ayurvedic dentistry is essential for its recognition in modern era.

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