Development of Oral Habits and Maturation of Oral Functions

ABSTRACT

At birth the neonate’s survival depends on instinctive sucking when lips and tongue are stimulated. Soon after, the mouth is used as the primary device for exploring the environment. When an object is placed in a baby’s hands or within his/her reach, the first thing the baby does is to put the item into his/her mouth, almost as if it is using the mouth to see this new environment. At the beginning the infant makes an effort by frequent learning and practice, later on the muscles start responding more readily. At the outset it takes a long time for the impulses to pass along the afferent nerves to the brain and back along the efferent nerves to the muscles involved. It has been stated that unconscious mental pattern of childhood develops from five sources, namely, instinct, insufficient or incorrect outlet to energy, pain or discomfort, abnormal physical size of parts, imitation or imposition of others. The important physiologic functions of the oral cavity are respiration, swallowing, mastication and speech. Infants are obligatory nasal breathers but the mandible and tongue must be positioned away from the posterior pharyngeal wall for the airway to be patent. If nasal breathing becomes obstructed, oral breathing must commence. Therefore, respiratory needs are the primary determinant of mandibular posture and tongue position. As the child grows and motor skills develop, there is improved motor control of the tongue and oral musculature. There appears to be a gradient of oral function maturation from anterior to posterior. In addition, the infant develops the ability to control a bolus with lateral and anteroposterior movements. This improved oral motor control helps the child to handle changes in the consistency of their diet and enables them to control a bolus of food with increased skill.

KEYWORDS development of oral habits, maturation of oral function, nutritive sucking

DEVELOPMENT OF HABIT

At birth the neonate’s survival depends on instinctive sucking when lips and tongue are stimulated. Soon after, the mouth is used as the primary device for exploring the environment. When an object is placed in a baby’s hands or within his/her reach, the first thing the baby does is to put the item into his/her mouth, almost as if it is using the mouth to see this new environment. By random movements infants discover their hands and feet and use these to continue stimulation of the mouth and related structures.¹

The newborn inherit some instincts which are composed of elementary reflexes. An instinct is one where the pattern and order are inherited, while in a habit the pattern and order are acquired, if constantly repeated during the lifetime of an individual. At the beginning, the infant makes an effort by frequent learning and practice, later on the muscles start responding more readily. At the outset it takes long time for the impulses to pass along the afferent nerves to the brain and back along the efferent nerves to the muscles involved. It has been stated that unconscious mental pattern of childhood develops from five sources, namely, instinct, insufficient or incorrect outlet to energy, pain or discomfort, abnormal physical size of parts, imitation or imposition of others.²

The development of oral habit is divided into three periods³:

1. Sucking period
2. Biting period
3. Multiple transfer period

The sucking period develops while the baby is still in the third trimester in its mother’s womb. This habit is developed to train the neuromuscular system.

Received Date: 04 November 2015 – Accepted Date: 01 December 2015 – Published Online: 16 December 2015
This system is the most perfectly developed system found at the time of the birth so that the oral phase of a new born is well fulfilled.

The transition from sucking period to biting period happens in a short period called the transition period. The biting period develops during the pre-school age (4–5 years old) and reaches a peak in school age (6–12 years old). Biting habit especially nail biting may become the sign of the transition period in a child from the thumb sucking habit previously. This may occur due to a demanding environment that a child has to face when child is expected to understand his/her responsibility, control his/her childish behaviour and follow some rules that may cause the child to feel frustrated and depressed.

The transition period in girls appears when they experience puberty and adolescent phase. This is different from boys who tend to fight back the demands that lead to a longer biting period than the girls.

**MATURATION OF ORAL FUNCTION**

The important physiologic functions of the oral cavity are respiration, swallowing, mastication and speech. Infants are obligatory nasal breathers but the mandible and tongue must be positioned away from the posterior pharyngeal wall for the airway to be patent. If nasal breathing becomes obstructed, oral breathing must commence. Therefore, respiratory needs are the primary determinant of mandibular posture and tongue position.

Respiratory and swallowing movements and activities have been noted in utero. The infant exhibits two reflexes at birth that are related to sucking. They are the rooting reflex and the sucking reflex.

- The rooting reflex, which lasts until the child is approximately 7 months of age, is the movement of an infant’s head and tongue towards a stimulus touching an infant’s cheek.
- In sucking reflex, active movements of the infant’s circumoral musculature, expresses milk from the nipple and it lasts for approximately 12 months. To obtain milk from the mother’s breast, the infant stimulates the smooth muscle in the breast to contract and express milk onto the tongue; this is sucking. The milk is carried to the pharynx and oesophagus by the tongue. In infantile swallow, there are active contractions of the musculature of the lips, a tongue tip brought forward into contact with the lower lip and little activity of the posterior tongue or pharyngeal musculature.

The milk glands of lactating mammals are surrounded by smooth muscle, which contracts to force out the milk. To obtain milk, the infant does not have to suck it from the mother’s breast and probably could not do so. Instead, the infant’s role is to stimulate the smooth muscle to contract and squirt milk into his mouth. This is done by sucking, consisting of small nibbling movements of the lips, a reflex action in infants. When the milk is squirted into the mouth, it is only necessary for the infant to groove the tongue and allow the milk to flow posteriorly into the pharynx and oesophagus. The tongue, however, must be placed anteriorly in contact with the lower lip, so that milk is in fact deposited on the tongue. The sequence of events defines an infantile swallow.

During the normal infantile swallow, the tongue lies between the gum pads and the mandible is stabilised by obvious contractions of the musculature of the lips, a tongue tip brought forward into contact with the lower lip, and little activity of the posterior tongue or pharyngeal musculature. Tongue to lower lip apposition is so common in infants that this posture is usually adopted at rest, and it is frequently possible to gently move the infant’s lip and note that the tongue tip moves with it, almost as if the two were glued together.

The sucking reflex and the infantile swallow normally disappear during the first year of life. The mandibular elevators, which play a prominent role in normal mature swallows, show minimal activity. The buccinator muscle is particularly strong in the infantile swallow as it is during nursing.

As the child grows and motor skills develop, there is improved motor control of the tongue and oral musculature. There appears to be a gradient of oral function maturation from anterior to posterior. In addition, the infant develops the ability to control a bolus with lateral and anteroposterior movements. This improved oral motor control helps the child to handle changes in the consistency of their diet and enables them to control a bolus of food with increased skill.

The adult swallow is characterised by a teeth together swallow, with tongue against the palate and lips relaxed. The transition from infantile to adult swallow is gradual and demonstrates characteristics of both; the lip contraction and tongue placement against the roof of the mouth which may or may not be present. This transitional swallow may be seen in 3–10-year-old children.

**Swallowing patterns**

Moyer lists the characteristic of the infantile swallow as follows:

1. The jaws are apart, with the tongue between the gum pads.
2. The mandible is stabilized primarily by contraction of the muscles of the VIIth cranial nerve and the interposed tongue.
3. The swallow is guided, and to a great extent controlled by sensory interchange between the lips and the tongue.

With the change from semisolid to solid food and the eruption of teeth there results a modification of the swallowing act. The tongue no longer is forced into the space
between the gum pads or incisal surfaces of the teeth, which actually contact momentarily during the swallowing act. Mandibular thrust diminishes during a transitional period of 6–12 months. The mandibular elevators take over the role of stabilising the mandible as the cheek and lip muscles reduce the strength of their contraction. The spatula-like portion of the tongue collects the food and forces it posteriorly. The tip of the tongue is no longer moving in and out between the anterior gum pads but assumes a position near the incisive foramen at the moment of deglutition. This “somatic swallow” contrasts with the relatively immature “visceral swallow” of the newborn.

As Fletcher pointed out, the infantile swallow is attributed to a significant difference in oral cavity morphology and to large tongue size, orientation and suspensory system. In the neonate the general bodily dimensions change on a ratio of five to one whereas the infant tongue only doubles in size. The expansion of peripheral attachments continues well into the postnatal period. The change to the adult swallow pattern occurs gradually in what has been called the transitional period. Neuromuscular maturation, change in head posture and gravitational effect on mandible are some of the conditioning factors.

Usually, by 18 months of age, the mature swallow characteristics listed by Moyers are readily observable:

1. The teeth are together.
2. The mandible is stabilised by contractions of the mandibular elevators, which are primarily the Vth cranial nerve muscles.
3. The tongue tip is held against the palate, above and behind the incisors.
4. There are minimal contractions of the lips during the mature swallow.

Non-nutritive sucking is considered normal for children during infancy. The most common form is thumb or finger-sucking. Since the mouth is the initial avenue of communication with the outside world, and since the orofacial musculature is relatively well developed, this non-nutritive sucking apparently gives the infant a feeling of warmth, a glow, a sense of satisfaction or euphoria that is closely linked to the infantile or visceral swallowing mechanism. As other avenues of communication with the outside world develop, e.g.; other muscle systems mature, and as visual and auditory stimuli become meaningful; the euphoria induced by the oral activity assumes less importance. In the average child, the non-nutritive sucking habits spontaneously disappear sometime between the sixth and eighteenth months of life. In some children these habits may be normal for at least another year or so.

According to Christensen et al. (2005), the oral habits detected at the age of 3–6 years old are an important issue because after this age, the oral habits are considered as abnormal.

O’Brien et al. (1996) reviewed the literature and concluded that there are essentially two forms of sucking: the nutritive form (breastfeeding and bottle feeding) which provides essential nutrients and the non-nutritive form which ensures a feeling of well-being, warmth and sense of security. Non-nutritive sucking is probably the earliest sucking habit adopted by infants in response to frustration and to satisfy their urge and need for contact. Children who neither receive unrestricted breastfeeding nor have access to a pacifier may satisfy their need with alternative habits such as finger sucking or sucking of other objects (a blanket or toy), which might be detrimental to their dentofacial development.

**NUTRITIVE SUCKING**

**Breastfeeding**

The infant begins life with a well-developed tongue-thrusting mechanism. This nursing instinct is one of the best developed of all infantile movements and is quite a contrast to the akimbo and apparently meaningless activities of the extremities. It is an efficient mechanism, too, as the tongue darts forward innumerable times to obtain milk from the mother’s breast or from a reasonable facsimile thereof. There are no teeth to get in the way, and the dominant posture of the tongue is one in which the centre is depressed, the peripheral portions are raised and the mass is elongated, ready for plunger like action. The instinct is so powerful that the infant usually engages in the sucking act even when there is no nipple present. There is very little in the way of an articular eminence, so the mandible moves forward readily to assist in the nursing act. Lips purse and move rhythmically in unison. Rochelle et al. (2010) described breastfeeding more than mere nutrition; it is a decisive and primordial factor in the correct maturation and growth of the stomatognathic system, which maintains them apt for exercising the development of the orofacial musculature, and in turn will guide and stimulate the development of physiological functions, guaranteeing survival and quality of life. The stomatognathic system performs many functions, comprising suction, swallowing, chewing, speech/articulation, which involve the neuromuscular activities of the face, affecting and producing continual changes in the forces that act on bones and teeth. Therefore, breastfeeding is the best orthopaedic appliance one can offer an adult’s face in terms of harmonious development.

Natural breastfeeding is performed through enormous muscular effort. The newborn is forced to bite, advance and retract the mandible, which helps in the development of the entire muscular system (particularly the masseter, temporal and pterygoid muscles) and acquire the muscular tonus required for use when the time for chewing arrives. On the other hand, the early introduction of the feeding bottle, although it satisfies the baby’s nutritional needs, annuls an enormous quantity of excitement that begins in the mouth, particularly of the temporomandibular joints, and does not provide
the development responses necessary for facial growth and development.

**Bottle feeding**

The effects of bottle feeding on dentofacial development vary according to the type of nipples used. Artificial nipples are available in various sizes and shapes. A comparison between existing nipples reveals important differences in the length and form of the nipple, the location of the holes, the rate of liquid flow and the flexibility. Also, some nipples are physiologically designed and referred to as “orthodontics.”

When a non-physiologically designed nipple is used, the end of the nipple is almost against the pharyngeal wall. The liquid is then released almost directly into the digestive tract, decreasing the period of predigestion. Also, the flow of milk may be too rapid because of the size of the openings or the number of holes in the nipple. Moreover, the holes may be enlarged by parents, in order to increase the milk flow. Consequently, the infant will either force the nipple out of his/her mouth or regulate or stop the flow with the tip of his tongue. Thus, certain muscles involved in breastfeeding are either immobilised (orbicularis oris, masseter), overactive (chin muscle) or malpositioned (the tongue is pushed backward) and may produce an abnormal dentofacial development in the child. Davis and Bell (1991) found a highly significant association between bottle feeding and incorrect relationship of the teeth in the anteroposterior plane.

As per Jyoti and Pavanalakshmi (2014) the physiologically designed flat shaped nipple which improves labial seal, helps in a forward movement of the tongue under the flat surface of the nipple, draws it backward and upward against the hard palate of the infant and a result the child has to work and exercise the lower jaw. The posterior part of the tongue then awaits the milk and pushes it down into the esophageal area and milk will flow as a reason of tongue’s and cheeks peristaltic like action, instead of being squirted into the throat, usually occurs with the use of inadequate nipple. The physiologically designed nipples seem better adapted to the anatomy and physiology of sucking.

**REFERENCES**