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Digit-sucking: Etiology, clinical implications, and treatment options

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ENDEAVOR BUSINESS MEDIA

Digit-sucking: Etiology, clinical implications, and treatment options

Educational objectives

- Recognize the signs of digit-sucking habits and explain the potential ramifications
- Identify possible causes
- Determine when to seek treatment
- Provide treatment options, referrals, and other resources

Abstract

Nonnutritive sucking is a normal reflex in infants up to six months of age. While most children grow out of this habit, many do not. There are several different theories as to why a child may continue the habit. Clinical implications include the development or relapse of malocclusions and bony structural changes, speech and articulation issues, chewing and swallowing problems, airway and breathing difficulty, and more. The severity of this habit and the corresponding signs are dependent on many factors, including frequency, intensity, duration, and the number and position of digits involved. There are several treatment options available, which will be discussed in this course. It is important for the dental care provider to be able to identify clinical signs of sucking habits, determine if and when treatment is necessary, and provide the patient and/or guardian with treatment options, referrals, and other resources. This course will provide the dental care provider with the confidence and knowledge to adequately manage these patients.

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Etiology of sucking habits

Sucking is considered a normal behavior in infants and an important part of human development. There are two basic types of sucking: nutritive and nonnutritive.[1] During nutritive sucking, an infant receives nourishment through a breast or bottle. Nonnutritive sucking habits provide no nourishment and are often associated with finger(s) or a pacifier. Nonnutritive sucking of the fingers is also referred to as "digit-sucking." Digit-sucking is considered a habit if it is a prolonged or repetitive behavior.[2]

Both nonnutritive and nutritive sucking are rhythmical and involve two basic components: suction and expression. Suction involves the negative pressure created by the lip seal and velopharyngeal closure as the mandible is lowered. Expression involves the upward compressive movement of the tongue.[3]

Though nonnutritive sucking provides no nourishment, there are many known benefits. Nonnutritive sucking can promote self-regulation and mouth exploration. It can also help with the coordination of sucking and swallowing patterns and has been used strategically to facilitate transitioning from tube to oral feeding in preterm infants.[4]

Sucking can sometimes be seen on imaging in utero, with the fetus sucking finger(s) and swallowing amniotic fluid.[2] Internationally, the incidence of digit-sucking in early life is reported to be anywhere between 34% to 90%, and many children stop nonnutritive sucking habits as they age.[2] The average age of habit cessation is just less than four years old.[2] Still, some children fail to grow out of the habit and continue it throughout adulthood. According to both the American Association of Orthodontists and the American Dental Association, if a child does not quit a digit-sucking habit on his or her own by age four, the parents should actively discourage the habit.[2] Digit-sucking is considered chronic if it occurs in at least two environments (e.g., home, school, or another location) after the child is five years of age.[2]

To properly address a digit-sucking habit, it is important to understand the possible underlying causes. To date, several theories and hypotheses have been proposed regarding the etiology of digit-sucking. This includes, but is not limited to, the psychoanalytical theory, the oral drive theory, the sensory deprivation theory, the learning theory, and the rooting and sucking reflex theories. Each of these theories, as well as a few other hypotheses, will be covered briefly here.

PSYCHOANALYTICAL THEORY

In the early 20th century, psychologist Sigmund Freud established a theory describing digit-sucking as an autoerotic and pleasure-seeking behavior, with an underlying cause related to psychopathology and problems with emotional development.[2] He proposed that sucking behaviors stimulate the erogenous zone of the mouth. Erogenous zones are bodily areas with concentrated nerve endings and are highly sensitive. He suggested that sucking occurs because of an infant's need for satisfaction rather than the need for nutrition.[2,5] While psychoanalytical theory was once very influential, its reputation has declined in recent decades.

ORAL DRIVE THEORY

This theory supports the Freudian belief that sucking increases the erotogenesis of the mouth, but it further suggests that the strength of an individual's drive to suck is determined by how long he or she is fed through nutritive sucking. According to this theory, the oral drive is strengthened through prolonged nursing, rather than the frustration of weaning.[5]

SENSORY DEPRIVATION THEORY

According to this theory, repetitive digit-sucking may induce sensory deprivation.[2] It is thought that the frequent and monotonous stimulation may lead to the reduction of sensory receptors in the mouth, and this deprives an individual of normal sensory input. This hypoarousal may cause a child to suck even more to achieve the same results.

LEARNING THEORY

The learning theory holds that digit-sucking is not simply an innate behavior but rather a learned behavior. One way that children learn is through "mirroring": observing and imitating others, their actions, and the resultant rewards. For example, according to this theory, sucking habits could arise from a child mimicking a sibling. While there may be a genetic predisposition to digit-sucking behaviors, learned behavior may account for some of the incidences of more than one individual with a digit-sucking habit in a family unit.[6]

ROOTING AND SUCKING REFLEX THEORIES

Rooting and sucking are infantile reflexes seen from birth, and both of these reflexes are important for feeding. The rooting and sucking reflex theories suggest that an infant's primitive reflexes are responsible sucking behaviors, and a failure of reflex integration results in an abnormal, prolonged habit.

The rooting reflex occurs when a child turns his or her head toward a stimulus. The rooting reflex is active until about three to six months of age. The sucking reflex occurs when the palate is stimulated. The sucking reflex is active until six to 12 months of age, but a child can continue to suckle and suck liquid from the breast and bottle as needed.[7] Around five to six months of age, children begin discriminative mouthing, which will promote a child's ability to eat solid foods. Around this age, because complementary foods are introduced, infants are no longer dependent solely on sucking for nutrition.

NEUROPHYSIOLOGICAL EFFECTS AND THE BRAIN'S REWARD SYSTEM

Another hypothesis is that sucking results in a release of "happy" hormones, so children suck because it feels good. Research has shown that digit-sucking produces this positive neurological response at the incisive papilla, an area of highly concentrated nasopalatine nerve receptors, which are linked to the locus coeruleus. The locus coeruleus is an area of the brain associated with the neurotransmitters serotonin, norepinephrine, acetylcholine, and dopamine.[8] Additional research in infant pain management has validated that serotonin production increases as a result of nonnutritive sucking.[9] Some have suggested that the levels of beta endorphins can also be modulated through nonnutritive sucking, but evidence to substantiate this claim is lacking.

Because sucking feels good, it incentivizes the brain's reward system. There

are three basic divisible psychological components of a reward system: liking, wanting, and learning. "Liking" refers to the hedonic impact, "wanting" refers to incentive salience, and "learning" refers to predictive associations and cognitions.[10] Digit-sucking is analgesic in nature and can be used to self-soothe and cope with pain, fear, anxiety, or other psychological disturbances.

DIGIT-SUCKING AS A CONSEQUENCE OF ANKYLOGLOSSIA

Another suggested cause of thumb sucking is ankyloglossia. At rest, the tongue should be in a palatal position with the tip touching the incisive papilla. It has been suggested that a tongue that is restricted in its movement (i.e., ankyloglossia) cannot stimulate the palate, and a child may use his or her digits for self-stimulation.[11]

DIGIT-SUCKING TO AID IN SLEEP

Serotonin released during sucking has been associated with happiness and vast physiological functions and behaviors, including eating, sleeping, circadian rhythmicity, and neuroendocrine function.[12] The tonic stimulation of the serotonergic system during wakeful periods has been associated with the generation of "sleep pressure," which, along with the circadian clock, is essential for good, restorative sleep.[13,14] Serotonin is also the precursor to the hormone melatonin, which is important in the regulation of the sleep-wake cycle.[15] Interestingly, nonnutritive sucking is common during periods of fatigue and at bedtime, indicating that perhaps finger-sucking is used to build up sleep pressure.

Nighttime digit-sucking can ease a child to sleep. Research has shown that infants who engage in digit-sucking experience fewer night wakings, less sleep during the day, and longer stretches of sleep at night.[16] It is rumored that digit-sucking can stimulate deeper stages of sleep, although no research has been done on this hypothesis to date.

DIGIT-SUCKING TO PROTECT THE AIRWAY

Another hypothesis is that digit-sucking can be used to protect the airway. The basis of this hypothesis is that digit-sucking can seal the lips, pulling the tongue and jaw down and forward to promote nasal breathing, as in the head-tilt/chin-lift and jaw-thrust maneuvers used with CPR. Fingers can also be used to prop the mouth open at night to facilitate mouth breathing.[17] Research reveals that a lower respiratory rate and an increase in oxygen levels often occur during nonnutritive sucking.[12]

DIGIT-SUCKING RELATED TO HUNGER

Some have suggested that infants exhibit nonnutritive sucking behaviors due to a lack of satiety after a feed.

Assessing severity

Severity of a digit-sucking habit is determined by a combination of several factors, including the frequency, intensity, duration, as well as the number and position of digits involved. Frequency is defined as how often the habit occurs during a given period. Intensity is defined as the force of sucking bursts in a given period. Duration can be defined as the length of time that the sucking continues.

Not all digit-sucking habits involve the thumb. One or more digits can be involved. Children will often develop an affinity for a particular hand or finger(s).[18] Some digit-sucking habits also involve transitional objects and/or other concomitant habits, such as hair-twirling or blanket-sucking. There have been many attempts to classify digit-sucking, including Subtelny (1973), Cook (1995), and Johnson (1993), based on various factors, such as the position of the digit in the mouth.[19]

Effects of digit-sucking

MALOCCLUSIONS AND ROOT RESORPTION

Teeth are subject to both intrinsic (e.g., lips, cheek, and tongue) and extrinsic (e.g., orthodontics and/or digits) forces, and six hours of force applied each day is needed in order to elicit tooth movement.[2] Digit-sucking can alter the balance of forces on the teeth and has the potential to cause tooth movement.[2] One of the most common malocclusions seen with digit-sucking is the anterior open bite.[20] An anterior open bite can be symmetrical or asymmetrical, depending on the position of the digits during the habit.[21] An anterior open bite is one of the most difficult malocclusions to manage orthodontically, and posttreatment orthodontic relapse is common.[22]

Other common malocclusions seen in digit-sucking individuals include the posterior crossbite, overjet, flaring of the maxillary incisors, and in more severe cases, the lingual retrusion of the mandibular anterior incisors.[20,21] Digit-sucking

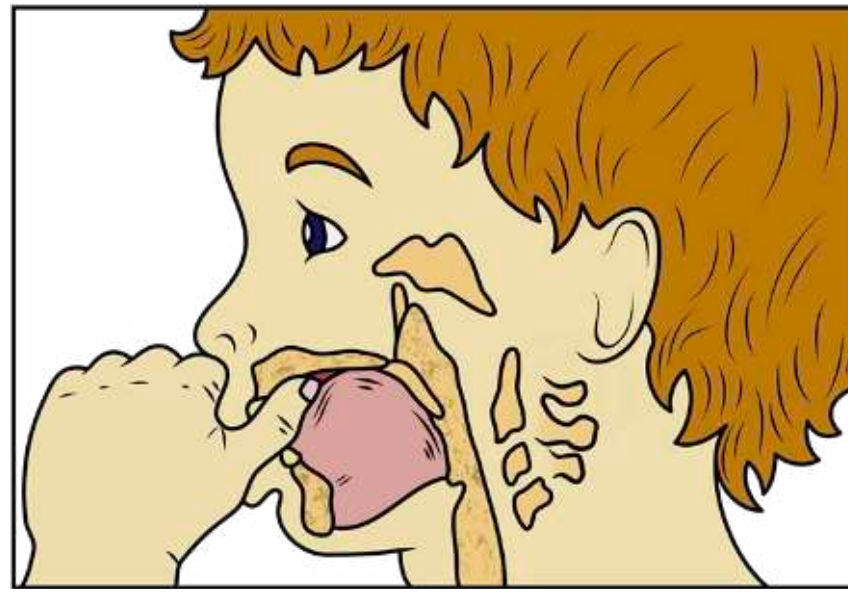

FIGURE 1: The pressure from the thumb, lips, and tongue can contribute to changes in dentofacial development.[1]

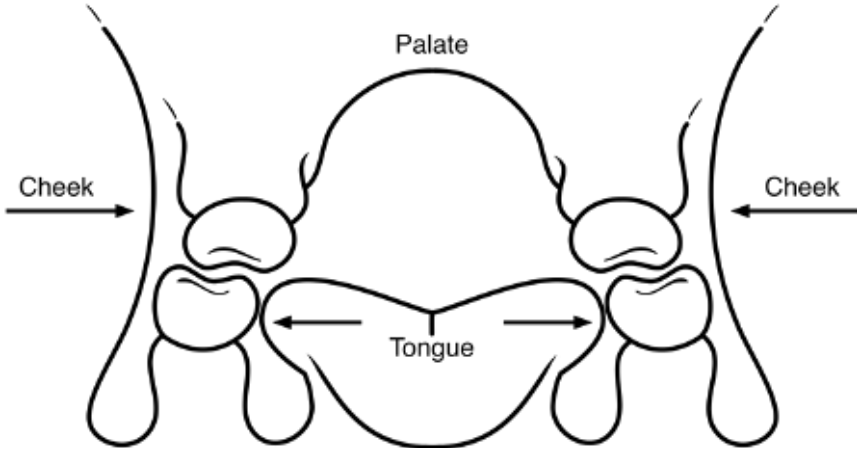

FIGURE 2: During digit sucking, the tongue is depressed into the mandible. From this low position, the pressure from the tongue cannot counterbalance the pressure exerted by the lips and cheek.[28]

has also been frequently associated with angle class II malocclusions.[20] Increasing the frequency, intensity, and duration of the habit correlates proportionally with an increase in the risk of developing a malocclusion.[2]

Orthodontists experience some other unique challenges in treating children with nonnutritive sucking habits. For example, atypical root resorption of primary and permanent central incisors has been noted in thumb-sucking patients.[23] This is a factor the orthodontist should consider during treatment planning.

ALTERATIONS IN OROFACIAL GROWTH AND DEVELOPMENT

Tooth positioning is not the only orthodontic concern for individuals with digit-sucking habits. The forces created as a result of a digit-sucking habit can alter the general trajectory of orofacial growth and development in both the horizontal and vertical planes. Children with prolonged digit-sucking habits have a propensity toward undesirable skeletal changes and a downward (vertical) facial growth pattern, a deficient midfacial profile, and a narrow, v-shaped maxillary arch.[24-26] Nonnutritive sucking has been associated with a decrease in maxillary intra-arch distance, which corresponds with a decrease in nasopharyngeal airway capacity.[27] In a narrow maxillary arch, there may not be enough room to accommodate a proper palatal rest position for the tongue. A narrow upper jaw may require orthodontic expansion or surgical intervention to correct.

ORAL AND FACIAL MUSCLE DYSFUNCTION

Digit-sucking involves the unfavorable use of the oral and facial muscles. This is known as an orofacial myofunctional disorder. An orofacial myofunctional disorder is defined as the "abnormal resting labial-lingual posture of the orofacial musculature, atypical chewing and swallowing patterns, dental malocclusions, blocked nasal airways, and speech problems."[29]

The main structures used for sucking are the masseter, orbicularis oris, mentalis, buccinator, superior pharyngeal constrictor, and pterygomandibular raphe.[1] Hyperactivity of the buccinator muscles can put excessive, unbalanced pressure on teeth and the alveolar bone, which can result in narrow arches and malocclusions.[30] Electromyography (EMG) assessments of digit-sucking revealed that lip muscles and the mentalis are also very active during nonnutritive sucking activities.[31,32]

With digit-sucking, the lower lip can become hyperactive, and the upper lip becomes shortened and hypotonic, contributing to lip incompetence.[8] Meanwhile, the finger(s) displaces the tongue in a downward position, away from the maxillary arch.[25] With the tongue resting in a low and forward position, digit-sucking also promotes tongue-thrust swallowing. A tongue-thrust swallow is characterized by dentalized tongue movement during the swallow, in an anterior or lateral direction.

Retraining the tongue to rest in the proper palatal position after digit-sucking has been eliminated is imperative for long-term stability of the orthodontic treatment and the prevention of many other problems.[26,27] Orofacial myofunctional therapy can be used to help patients to achieve palatal tongue rest posture and lip closure. It can also be used to correct tongue functioning

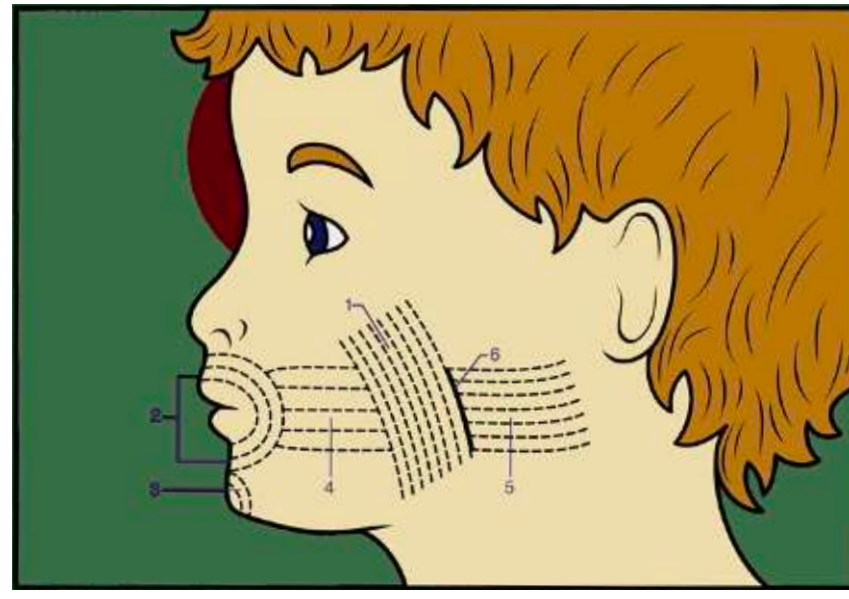

FIGURE 3: The main structures involved in sucking and swallowing are the: 1) masseter, 2) orbicularis oris, 3) mentalis, 4) buccinator, 5) superior pharyngeal constrictor, and 6) pterygomandibular raphe.[1]

during chewing and swallowing as well as lip incompetence.[33]

Digit-sucking children have three times the risk of developing a speech sound disorder.[34] Articulators used in speech sound production include the pharynx, velum/soft palate, hard palate, alveolar ridge, tongue, teeth, and lips. Research has shown that there is a correlation between "s" sound distortions and increased overjet.[35] Other research reveals an association between anterior open bites and lisps.[35] Orthodontic habit appliances used to correct digit-sucking and/or tongue-thrusting can also interfere with various speech sounds.[36] Research on infants suggests that limited free tongue movement can negatively impact auditory speech perception.[37]

OTHER COMPLICATIONS

Digit-sucking can put a child at increased risk of developing infections and other conditions of the lips, mouth, and fingers. Irritation of the lips, oral mucosa, and fingers has been noted. One example is "dishpan finger," which is a form of contact dermatitis related to irritation from frequent moisture.[5] Bony deformities can be noted in the fingers.[38] Studies have shown that digit-sucking children have a higher chance of developing infections, including parasites (e.g., pinworms), compared to nonsucking children.[39]

Habit cessation

Digit-sucking is a complex issue. Cessation is possible, but additional steps may be needed to ensure a successful quit attempt, including screening for possible contributors to the habit (e.g., an assessment of the airway and restrictive lingual range of motion evaluation). A negative experience with a quitting attempt can negatively impact future attempts.

While the American Academy of Pediatric Dentistry and the American Dental Association offer some guidelines for treatment, as shown in figure 4, there is no standard treatment for the cessation of nonnutritive sucking habits. Cessation methods can be classified into the following general categories: preventive therapy, psychological therapy, reminder therapy, reward therapy, punishment therapy, appliance therapy, and orofacial myofunctional therapy.

PREVENTION

Treatment for digit-sucking habits in infants is mostly preventive in nature. Some parents may choose to substitute the finger with a pacifier. By providing a child with a pacifier, the parent may feel that they have more control over weaning their child from the habit. The American Academy of Pediatrics and the American Academy of Family Physicians both agree that, if a pacifier is used, children should be weaned from it within the second six months of life.[41] Around six months of age, the parent may be able to introduce age-appropriate items for the infant to chew or mouth on, instead of suck.[7]

Parents may decide to swaddle their infant as a preventive measure. Swaddling can be calming, promote sleep, and provide nonpharmacologic pain management.[42] Swaddling should be used in moderation, as it poses some risks to infants, including the limitation of natural growth, development, and movement.

Another way to potentially prevent a digit-sucking habit from occurring in the first place is through breastfeeding at will, allowing the child to feed to his or her content when he or she shows signs of hunger. Some research has shown that bottle-feeding does not appear to have the same effect.[42]

PSYCHOLOGICAL THERAPY

Creating distractions and keeping the hands busy could be considered psychological therapy. Professional psychological counseling may also be employed as needed in patients who are unwilling and/or unresponsive to quitting, sucking for attention, or seeking revenge.[20] Current psychotherapeutic techniques to address digit-sucking may include, but are not limited to, cognitive behavioral therapy, motivational interviewing, and insight therapy. Psychiatric intervention or psychotherapy may be especially important for an individual experiencing bullying, home or family problems (e.g., moving, divorce, or death), abuse, or other issues.

Figure 4: Current guidelines for digit-sucking[2,40]

AAPD	ADA
• AAPD supports the individualized approach for each child in evaluating oral habits. • Where appropriate, the AAPD encourages treatment of oral habits to prevent or intercept possible malocclusion or skeletal dysplasia from occurring.	• Praise children when they don't suck their thumb (e.g., verbal praise, stickers). • Find alternative ways of comforting and soothing for children (e.g., stuffed toy). • Provide reminders or negative reinforcement for thumb sucking (e.g., place topical bitter liquids such as Mavala Stop and Thum on the thumb; put a bandage around the thumb). • Involve older children in ways in which they can stop sucking (e.g., have children help create their own reward system).

REMINDER THERAPY

For a reminder to be effective, a patient must be compliant and ready to quit. A reminder is neither a punishment nor reward; it is neutral. Oral deterrent therapy, when not used as a punishment, can be considered a form of reminder therapy. This involves application of a distasteful substance on the fingers, such as capsaicin or another chemical.

Other common types of reminders are finger bandages, digit tape, or soft hand coverings (e.g., gloves or socks). It is worth noting that there have been a few reports of tourniquet syndrome as a result of reminder bandages being applied too tightly. Caregivers should be mindful of this when applying reminders.[43]

REWARD THERAPY

Reward therapy can be useful for an individual who is ready to quit a habit and simply needs a good reason. This involves offering prizes to children when they do not suck. Contingency contracting (also known as bribing) can also be a form of reward therapy.

PUNISHMENT

Parents are often unaware that when it comes to digit-sucking, punishment is largely ineffective. Common forms of punishment include taking away a comfort or transition object or nagging. Negativity from caregivers can have the opposite of the desired effect, as it can cause a child to hide their habit or suck even more. It is recommended that caregivers use a kinder and gentler approach.[20]

MECHANICAL RESTRAINTS

Mechanical restraints, such as thumb or arm guards, physically prevent an individual from putting his or her hands in the mouth. They can be purchased or made at home. Parents sometimes use elastic bandage wraps with popsicle sticks to prevent the digit(s) from reaching the mouth.

Some "three-alarm systems" have also been proposed. These systems offer multiple reminders and/or mechanical restraints as a fail-safe.

APPLIANCE THERAPY

Appliance therapy for digit-sucking involves fixed or removable orthodontic appliances designed to prevent an individual from sucking his or her finger(s). They may include cribs, spikes, rakes, prongs, or other types of "reminders."

Orthodontic appliances have some limitations. First of all, they can be considered punitive. They may be contraindicated in patients with a high dental caries risk and/or lack of cooperation.[20] They also have been associated with restrictions in food choices and an impaired ability to chew and swallow, taste, and process emotions.[44] Furthermore, fixed or removable orthodontic habit appliances can inhibit the growth and development of the dental arches.[45] Finally, some determined children will still indulge in their habit with orthodontic appliances in place.

OROFACIAL MYOFUNCTIONAL THERAPY

Orofacial myofunctional therapists offer positive, appliance-free habit cessation programs that tout high success rates.[46,47] Orofacial myofunctional therapists educate, empower children to take control over their own habits, encourage family involvement in the process, and provide support and accountability. Orofacial myofunctional therapists combine aspects of other therapeutic techniques, such as reminders, rewards, and distractions. Once the cessation of digit-sucking has been achieved, a child may be a candidate for a full orofacial myofunctional therapy program to correct tongue rest posture, lip incompetence, as well as maladaptive chewing and swallowing patterns.

Conclusion

There are many hypotheses regarding the etiology of digit-sucking habits. We now know that digit-sucking may be more than just a bad habit; it may be a compensatory strategy related to ankyloglossia or an airway obstruction.[26] It is the medical and dental provider's duty to screen for those conditions before recommending any form of intervention. An appropriately timed and successful quit attempt can redirect orofacial growth and development and prevent many long-term problems.

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Notes

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1. Which of the following is true about sucking in infants?
   A. Sucking is considered a normal behavior.
   B. There are two basic types of sucking.
   C. Both A and B
   D. Neither A nor B

2. Nonnutritive sucking can help with:
   A. Exploration
   B. Self-regulation
   C. Transitioning from tube feeding to oral feeding
   D. All of the above

3. Sucking behaviors are often first observed in utero, and the average age of digit-sucking cessation is:
   A. In the first six months
   B. In the first year
   C. Just before age 4
   D. By age 15

4. According to both the American Association of Orthodontists and the American Dental Association, if a child does not quit a digit-sucking habit on his or her own by age ___, the parents should actively discourage the habit.
   A. 6 months
   B. 1 year
   C. 2 years
   D. 4 years

5. Digit-sucking is considered chronic if it occurs in at least ___ environment(s) (e.g., home, school, or another location) after five years of age:
   A. One
   B. Two
   C. Three
   D. Four

6. Which of the following theories states that digit-sucking leads to the reduction of sensory receptors in the mouth, thus reducing an individual's normal sensory input?
   A. Psychoanalytical theory
   B. Oral drive theory
   C. Sensory deprivation theory
   D. Oral gratification theory

7. Which of the following theories was first proposed by Sigmund Freud and states that digit-sucking is an autoerotic and pleasure-seeking behavior?
   A. Psychoanalytical theory
   B. Oral drive theory
   C. Sensory deprivation theory
   D. Oral gratification theory

8. Which class of malocclusion has been frequently associated with digit-sucking?
   A. Class I
   B. Class II
   C. Class III
   D. None of the above

9. Which of the following theories states strength of an individual's drive to suck is determined by how long he or she is fed through nutritive sucking and not the frustration of weaning?
   A. Psychoanalytical theory
   B. Oral drive theory
   C. Sensory deprivation theory
   D. Oral gratification theory

10. Which of the following theories states that digit-sucking is not innate and must be learned?
    A. Learning theory
    B. Combination of psychoanalytic and learning theories
    C. Rooting and sucking reflex theories
    D. Sensory deprivation theory

11. Which of the following theories associates digit-sucking with natural infantile reflexes of rooting and sucking?
    A. Learning theory
    B. Combination of psychoanalytic and learning theories
    C. Rooting and sucking reflex theories
    D. Sensory deprivation theory

12. The ___ reflex is active until about 3-6 months of age and involves a child turning his or her head to the side of the face that is touched.
    A. Rooting
    B. Sucking
    C. Moro
    D. Walking/stepping

13. The ___ reflex is active until about 6 to 12 months of age and involves a child sucking anything that touches the roof of the mouth.
    A. Rooting
    B. Sucking
    C. Moro
    D. Walking/stepping

14. Research has shown that digit-sucking produces this neurotransmitter.
    A. Serotonin
    B. Cortisol
    C. Both A and B
    D. Neither A nor B

15. Which of the following is not part of the brain's reward system?
    A. Liking
    B. Wanting
    C. Avoiding
    D. Yearning

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QUESTIONS

16. This condition involves limited range of motion of the tongue. It has been proposed that with this condition, the tongue cannot stimulate the palate, and a child may use his or her digits for self-stimulation.
    A. Macroglossia
    B. Glossitis
    C. Lip incompetence
    D. Ankyloglossia

17. Research has shown that infants who engage in digit-sucking experience which of the following?
    A. Fewer night wakings
    B. Less sleep during the day
    C. Longer stretches of sleep at night
    D. All of the above

18. This hormone is the precursor for melatonin, which helps to regulate the sleep-wake cycle.
    A. Cortisol
    B. Dopamine
    C. Serotonin
    D. Endorphins

19. Which of the following factor(s) determines the severity of a sucking habit and correlates proportionally with an increase in the risk of developing a malocclusion?
    A. Frequency
    B. Intensity
    C. Duration
    D. All of the above

20. According to the research, ___ hour(s) of force applied each day is needed in order to elicit tooth movement.
    A. 1
    B. 4
    C. 6
    D. 18

21. Which of the following is true about an anterior open bite (AOB)?
    A. It can be symmetrical or asymmetrical.
    B. It can be difficult to manage orthodontically.
    C. Posttreatment orthodontic relapse is common.
    D. All of the above

22. Swaddling, breastfeeding at will, and replacements are considered ___ treatments.
    A. Preventive
    B. Reward
    C. Mechanical
    D. Appliance

23. Fixed and removable orthodontic devices are a form of ___ therapy.
    A. Preventive
    B. Reward
    C. Mechanical
    D. Appliance

24. Prizes given for not sucking are a form of ___ therapy.
    A. Preventive
    B. Reward
    C. Mechanical
    D. Appliance

25. Arm splints, braces, or other immobilizers are a form of ___ therapy.
    A. Preventive
    B. Reward
    C. Mechanical
    D. Appliance

26. Reminders should be:
    A. Rewards
    B. Punishments
    C. Neutral
    D. None of the above

27. The American Academy of Pediatrics and the American Academy of Family Physicians both agree that, if a pacifier is used, children should be weaned from it:
    A. In the second 6 months of life
    B. After 1 year
    C. After 2 years
    D. Both advocate actively discouraging pacifier use at any age.

28. This type of therapy can help with lip incompetence:
    A. Orofacial myofunctional therapy
    B. Speech therapy
    C. Occupational therapy
    D. Physical therapy

29. Which of the following are types of psychological techniques that can be used to treat digit-sucking?
    A. Cognitive behavioral therapy
    B. Motivational interviewing
    C. Insight therapy
    D. All of the above

30. Cribs, spikes, rakes, prongs, and other reminders are types of ___ therapy.
    A. Preventive
    B. Reward
    C. Mechanical
    D. Appliance

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ANSWER SHEET

Digit-sucking: etiology, clinical implications, and treatment options

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1. Recognize the signs of digit-sucking habits and explain the potential ramifications
2. Identify possible causes
3. Determine when to seek treatment
4. Provide treatment options, referrals, and other resources

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1. Were the individual course objectives met?

   Objective #1: Yes No Objective #3: Yes No

   Objective #2: Yes No Objective #4: Yes No

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    _____

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8.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	23.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
9.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	24.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
10.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	25.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
11.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	26.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
12.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	27.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
13.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	28.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
14.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	29.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
15.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	30.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

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