

REVIEW ARTICLE

Non-nutritive Sucking Habits: A Review

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ABSTRACT

Digit sucking habit, a form of non-nutritive sucking, is a repetitive behavior that serves no perceivable social function, but effects the occlusion if persists for a longer period. Digit sucking not only receives attention from health professionals but often is an area that greatly concerns the parents and family of a child who practice this habit. It is, therefore, most important for the dentist who cares for children to understand this habit well to be able to help the parents and the child relate rationally to it and to manage the child's dental situation.

Key Words: Digit sucking, malocclusion, non-nutritive sucking habits.

Introduction

The term “non-nutritive sucking habit” (NNSH) encompasses the use of pacifiers (dummies, soothers), blankets and digit sucking (finger or thumb). Although the incidence of sucking habits varies considerably between different countries, these comforting habits are common in children in many populations. According to Oslon, the most common oral habit was thumb sucking or finger sucking,¹ with a reported incidence ranging from 13% to almost 100% at some time during infancy.^{2,3}

Foster⁴ (1982): The term digit sucking is synonymous with finger sucking or thumb sucking. It is defined as the placement of the thumb or one or more fingers in various depths into the mouth.

Etiology

The etiology of digit sucking has been explained by two theories, which involves emotional and learned behavior theories.

The psychoanalytic theory of Sigmund Freud relates finger sucking is the product of pleasure, that child derives from stimulating the oral erogenous zone. Fixation of the habit occurs if the infant sucking needs are not met. Finger sucking at later stage due to other psychological stress is usually considered a sign of regression (redevelopment of a previous habit). Both fixation and regression are the signs of emotional disturbance.⁵

The arousal of the sucking habit might be explained through the learning theory and the investigations supporting this theory. There are three factors related to prolongation of the habit. These maintain that prolonged extra nutritional sucking may

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develop from: (1) insufficient satisfaction of the sucking need in infancy (2) emotional disturbances (3) the pleasure derived from sucking.⁶

Classification

Subtelny and Subtelny¹ (1973) has graded thumb sucking into four types as shown in the Figure 1.

In the first group: Almost 50% of the children place the whole digit inside the mouth with the pad of the thumb pressing over the palate, while at the same time maxillary and mandibular contact is present.

In the second group (24%): The thumb is placed into the oral cavity without touching the vault of the palate. While at the same time maxillary and mandibular anterior contact is maintained.

In the third group (18%): The thumb is placed into the mouth just beyond the first joint and contacts the hard palate and only the maxillary incisors, but there is no contact with the mandibular incisors.

In the fourth group (6%): The thumb is not fully inserted into the mouth. The lower incisor makes contact at the approximate level of the thumbnail.

Types of Malocclusion that May Develop Depends upon a Number of Variables⁷

- Position of the digit
- Associated oro-facial muscle contractions
- The position of the mandible during sucking
- The facial skeletal pattern
- Intensity, frequency, and duration of force applied.

Johnson and Larson⁵ in an extensive review, noted that malocclusions produced by prolonged thumb sucking habits are characterized by anterior open bites, labial inclination of the maxillary incisors, an increase in overjet, and spacing of the maxillary incisors as shown in Figure 2. Other maxillary changes include an increase in arch depth, anterior displacement of the maxilla, high palatal vaults, and narrowing of the inter-canine and inter-molar arch widths. Class II canine and molar relationships and posterior cross bites have been observed in thumb-sucking individuals. In the mandible increases in inter-canine arch widths have been detected, and the incisors may be labially or lingually inclined.

Vertical and Horizontal Effects⁸⁻¹⁰

The digit, which is usually placed ventrally against the palate and against the lingual surfaces of the upper incisors, is positioned at an angle and forms a fulcrum, which consists of the digit, the wrist, and the forearm. The force produced by this lever may be subdivided into horizontal and vertical vectors.

These vectors mechanically either inhibit or exacerbate unfavorable growth. The horizontal vector generates pressure

on the palatal aspect of the alveolar process and the maxillary incisors as shown in the Figure 3. This results in lengthening and

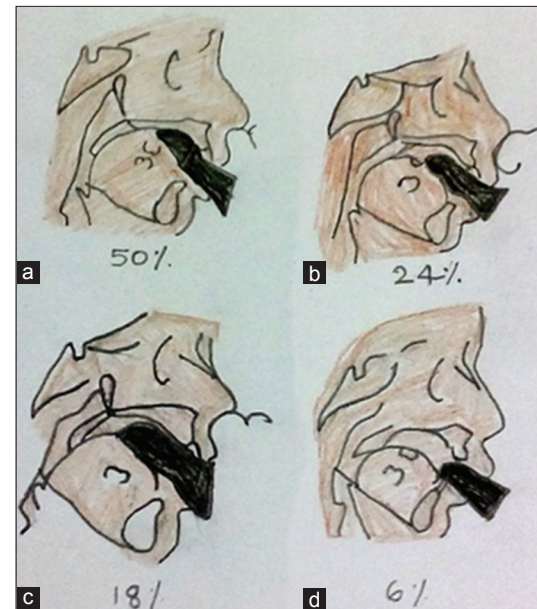


Figure 1: Subtelny's classification.



Figure 2: Anterior open bite.

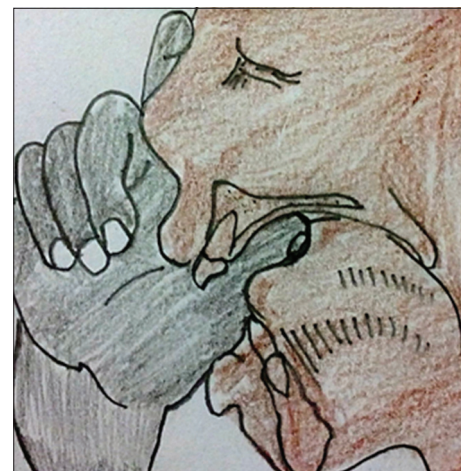


Figure 3: Digit placed against the palate acts as a fulcrum.

anterior displacement of the anterior maxillary base, proclination of the maxillary incisors and spacing and splaying of the upper incisors, all resulting in an increase in over jet. Over jet may be exacerbated by retroclined lingual incisors. The vertical vector delays the vertical growth of the anterior maxillary base, hindering the eruption of the anterior teeth while simultaneously allowing the posterior segments to over-erupt. The incisors cannot occlude, and an open bite is created.

Management

According to Forrester¹¹ (1981), three main areas should be assessed in constructing a treatment plan.

1. Emotional significance of the habit
2. The age of the patient
3. The status of the child's occlusion.

Emotional significance of the habit

Before initiating corrective procedures, it is important to determine whether the thumb-sucking is a meaningful or an "empty" habit. One should treat the meaningful habit with the psychological approach and the empty habit with the dental approach. Consultation with a psychiatrist is considered if the sucking habit is a symptom of an abnormal behavior problem.¹²

Treatment of An Infant (Birth To 2 Years)

Thumb sucking during infancy is of no concern to the dentist or the parent if no physical effect is produced on the teeth. When sucking is abnormally vigorous enough to displace the teeth, the problem is of concern and also could act as a symptom of:

1. Insufficient feeding
2. Inadequate love
3. Bored, unhappy, or over the fatigued child.

No attempt should be made to cure the habit in a malnourished or sick infant who may obtain significant emotional gratification from it. Frequently, the only treatment necessary may be a little more cuddling and playing with the child and simple instruction to the mother in the technique of feeding the infant.¹²

Treatment in A Preschool Child (2½-3 Years)

At these years, child begins to assert his/her independence from the mother and inevitably tensions and frustrations may occur causing an occasional short-lived sucking episode. In the preschool child, thumb sucking which is practiced only before going to bed may be disregarded being a benign activity, and correction may prove harmful. However, if it is frequently indulged during the waking hours, the child is over fatigued

bored or unhappy, then suitable factors in the environment should be corrected. A child should have ample play facilities and an adequate amount of self-expression.¹²

Treatment in 3-7 Years Old

This age group child may be more of a concern depending on the type of habit and whether the child is pulling the maxilla anteriorly or just sucking his digit with buccal constriction. The child with good molar intercuspatation and little anterior pull, i.e., the passive sucking child should be counseled, and the dentist should work along with the parent with contingent behavior modifications.¹²

Treatment In Children Older Than 7 Years

These children are mainly characterized by anterior open bite that will usually not close by itself due to functional patterns that have been established. These children will all require some form of active orthodontic treatment.¹²

Techniques for Habit Cessation⁵

Habit Awareness

Habit reversal therapy is commonly used in repetitive, body focused behavior disorders that cause significant functional impairment. It involves training the individual to recognize the behaviors preceding digit sucking, together with situations where it occurs. It also aids in teaching the individual about alternative responses to the habit behavior.¹³

Covert Sensitization

Covert sensitization is a procedure in which a cognitive-induced aversive response is paired with the habit. An imaginary picture of the activity to be eliminated is evoked and then accompanied by a mental image of an aversive response like nausea (Daniel-1974).

Contingency Contracting

Punishment using the time out from positive reinforcement

A contract of reward or punishment is made contingent on habit cessation or the lack of habit cessation, reward, respectively (Friman, 1987). Contingent reading has also been used to treat nighttime thumb sucking.¹⁴

Prevention of Covarying Response

Researchers suggest that individuals having a habit behavior are likely to have more than one habit. Covariation among habits suggests that behaviors with disparate topographies may be part of the same response class (maintained by the same reinforcing consequences) or part of a response chain. When thumb sucking covaries with another repetitive behavior, an effective treatment of one behavior may cause successful elimination of other behavior

also. Direct covariation between the two behavioral covariation researches is the exploitation of successful treatment of the other.¹⁵

Differential Reinforcement of Other (DRO) Behaviors

DRO behaviors are reinforcing the lack of the target response, in this case the lack of thumb sucking. The reward can also be applied to a different but related behavior, such as compliance to habit cessation therapy. If reinforcement schedule is lengthened as treatment progresses, it is called escalated DRO. In some studies, DRO plus reprimands were used. The reprimands consisted of holding the child, establishing the eye contact, and firmly admonishing the child to stop the targeted behavior.

Sensory Attenuation Procedure

Many procedures are designed to interrupt the sensory feedback experienced with NNS. These procedures are divided into appliance therapy and response prevention.

Reminder therapy

Reminder therapy is appropriate for those who desire to stop the habit but need some assistance. The purpose of these reminders should be thoroughly explained to the child. These are reminders for child to make the habit unpleasant and difficult to practice.

Finn¹⁵ (1972): Habit reminders can be basically divided into two extra oral reminders and intraoral reminders.

Extra Oral Reminders

Chemical and Mechanical therapy involves the use of bitter and unpleasant tasting preparations which are painted on the nails to serve as a deterrent to placing the fingers or thumb in the mouth. These preparations are effective only if the habit is new and are less effective in countering a long-standing habit. Simple devices for controlling thumb are the application of adhesive tape to the thumb or finger and bending the elbow.

Intra Oral Appliance

Palatal bar

The palatal bar is one of the principal habit reminders. It consists of a 0.030 inch round lingual arch wire attached to the upper first molar bands with an anterior platform, which clears the palate by about 1/8 inch. This keeps the thumb or finger from exerting pressure on the soft tissue of the palate. The seal is broken, there is no suction, and the pleasure of thumb-sucking is destroyed. An occlusal rest on the occlusal surface of the upper first premolars prevents the palatal bar from settling into the soft tissue. The bar must be so designed that it will not prevent the teeth from closing normally.¹⁶

Palatal arch

Bands are placed on either the maxillary second deciduous molars or the first permanent molars. The palatal arch is made from 0.040-inch stainless steel wire and is similar in design to the palatal crib, except that it does not have a vertical fence like portion.¹⁶

Palatal crib

Habit retraining appliance, which utilizes a blunt wire “reminder” which may prevent the child from indulging in the habit. The crib consists of a wire embedded in removable acrylic appliance similar to a Hawley retainer, or it may be a “fence” added to an upper palatal arch and used as fixed appliance¹⁷ as shown in Figure 4.

Hay-rake

Mack (1951) introduced a dental appliance for children over 3½ years of age who are persistent thumb suckers. A rake may be a fixed or removable appliance, just as the crib. As implied by the term, this appliance more nearly punishes than reminds the child. It is constructed as is the crib, but has blunt tines or spurs projecting from the crossbars or acrylic retainer into the palatal vault. The tine discourages not only thumb sucking but also tongue thrusting and improper swallowing habits as well.¹⁶

Blue grass

Appliance consists of a six-sided roller made of Teflon which is constructed over a 0.045 stainless steel wire which is soldered to bands placed on either the maxillary first molars or on the primary second molars as shown in Figure 5. The roller is placed in the most superior aspect of the palate and must not be in contact with the palatal tissue so that patients can roll them with their tongues. This device works through a counter-



Figure 4: Palatal crib.



Figure 5: Blue grass.

conditioning response to the original conditioned stimulus for thumb sucking. This appliance is placed for 3-6 months and in early or mixed dentition period it is indicated.¹⁸

Baker¹⁹ modified blue grass appliance with 4 mm acrylic beads, multiple rollers and thus expanding its use from primary to permanent dentition. The advantage of the new design is that it encourages maximum neuromuscular stimulation by using two or more beads, according to the principles of Castillo-Morales. One to four beads are placed on the cross palatal wire, depending on the amount of space available as shown in the Figure 6a and b.

Haskell and Mink recommended to leave the bluegrass in the mouth for 6 months after the habit has stopped. Earlier removal has resulted in the reappearance of the habit.

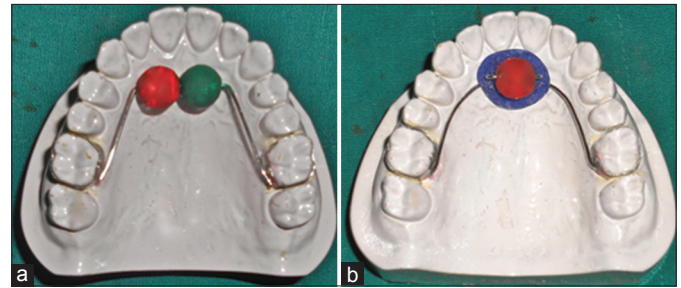
Quad helix

The quad helix is a fixed appliance used to expand the constricted maxillary arch. The helixes of the appliance serve as a reminder to the child not to place the finger in the mouth. May be modified to incorporate a roller simulating blue grass appliance as shown in Figure 7.

The disadvantages of intraoral appliances include a period of emotional upset until they get used to the appliance, speech being affected temporarily and difficulty in eating²⁰ (Haryett *et al.*, 1970). With the use of fixed orthodontic habit breakers increased tendency for caries and decalcification of enamel surfaces, gingival inflammation may occur.

Conclusion

NNSH may be considered normal till certain stage of the child's development. These may or may not be related to the emotional status of the child. If the habit is causing a malocclusion or other pathologic process, it is privilege and responsibility of the dentist to work with the child and parents toward a resolution of the problem.



Figures 6: (a and b) Modified blue grass appliances.

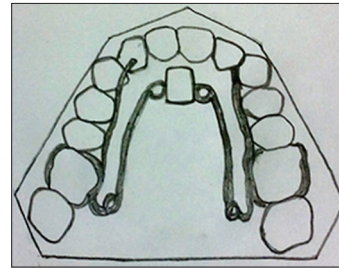


Figure 7: Quad helix with a roller.

Because the prevalence of habits decreases with age, various age ranges are selected as guidelines for the dentist in selecting an approach for the management and treatment of the activity.

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