

Thumb Sucking Habit And Management: Habit Breaking Appliances With Electronic Devices

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ABSTRACT

Thumb sucking is a non-nutritive habit which provides deleterious changes to the oral environment. The habit may be normal from 2-3.8 years of age, after that if the habit may continue this will result in malocclusion. The frequency and intensity of the thumb sucking habit will result in worse malocclusion. Both the child and the parents need counselling about the habit and result of malocclusion. The child may need remainder therapy or adjuvant therapy to withdraw the habit.

KEYWORDS *non-nutritive habit, management, electronic devices, habit breaking*

INTRODUCTION

Thumb sucking is a behaviour that can be grouped under a list of habits known as non-nutritive sucking habits¹. Thumb-sucking has been considered as an adaptive function by providing stimulation or self-soothing for the child². The habit of thumb sucking or digit sucking is normal until the age of 2 to 3 years of life. 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 child relate rationally to it and to manage the child's dental situation³.

Etiology

The development of sucking habit is a primitive reflex that appears early in infants¹. Sucking behaviour in children is associated with self-comfort and security. The finger sucking habit is closely related to the psycho-emotional maturity of a child. Most of the children discontinue this habit by themselves spontaneously by the age of 4 years when more developed self-management skills arise².

Incidence And Prevalence

By the age of 6 to 7 years, approximately 10% to 15% of children have a persistent thumb or digit-sucking habit⁴. Traisman and Traisman²² have reported that the average age at which digit sucking

stopped was 3.8 years, although other studies indicates that there is a persistent incidence of up to 20% at 4 years of age⁵.

Pathophysiology⁶

Thumb sucking can be characterized by the following, such as frequency, intensity, and duration of the habit. The severity is based on the duration of the force in thumb/digit which is more critical than its magnitude, and the resting pressure has the greatest impact on the position of the tooth which corresponding for malocclusion. Thumb sucking can lead to both skeletal malformations and dentoalveolar malformations..

Clinical Evaluation

Persistent thumb sucking habit is a rooting reflex in which there might be an underlying cause. So history of the child is very important. The history of the child must include the frequency, duration, and intensity of the thumb sucking¹. The child suck their thumb in various circumstance for instances or falling or during asleep, when they get bored, hungry, during stressful situations, or during melancholy mood.

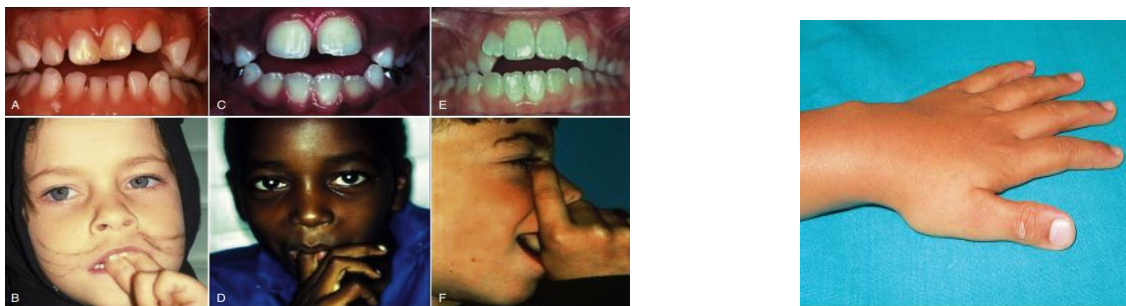


Figure 1 and 1

The clinical evaluation of the child must include blisters located in the affected thumb of the child due to vigorous sucking. Sucking pads or calluses can appear as well (fig2), being as a result of hyperkeratosis of that particular part. Findings of the oral examination includes the upper incisors with proclination and retroclination (fig1) of the lower incisors due to the placement of the thumb behind the upper incisors and resting pressure on lower incisors. The thumb can also prevent the eruption of the upper and lower incisors which may leading to the development of the anterior open bite along with increased overjet⁷.

MANAGEMENT

There are four different approaches for treating the child based on their willing to stop the habit⁸. They are counselling, remainder therapy, reward system and adjunctive therapy.

COUNCELLING is one of the widely applicable approach⁸ than other methods. Here the dentist should explain about the result caused by the non-nutritive sucking habit directly with the patient and make them understand the problems associated with it. This approach is applicable only for elder age group. Some child may respond to this approach and they successfully eliminate the habit⁸.

REMAINDER THERAPY includes waterproof tape like adhesive band aid on the offending finger, commercially available bitter tasting substance is painted on the digit which the child suck.

REWARD SYSTEM is like it is a contract between the parents and the child. If the child withdraws the habit within the selected period of time, the child is rewarded with praises or giving stars as an

appreciation or verbal praises. The reward is less successful if the child uses the habit during sleeping⁹. Reward system and remainder therapy are often combined to improve the success rate⁹.

ADJUNCTIVE THERAPY is the therapy which physically interrupt the habit and remind the patient⁹. This type of treatment is usually extraoral which involves elastic band aid or equivalent material to restraining the hand from reaching the mouth to suck¹⁰.

Within the orthodontic appliance interventions, there are several options available, including palatal cribs, spurs, palatal bars, hay rakes, and cage-type appliances¹¹. Once treatment is completed, there is still the possibility of relapse and reestablishment of malocclusion so a good follow-up is necessary⁷.

Electronic Devices Used

With the technology arising, there are new interventions proposed.

ALARMING WRIST WATCH, Krishnappa et al published in the year of 2020, a case of an 8-year-old male with persistent thumb sucking habit. They came up with anew device with an alarm that was activated when the child placed the finger into the mouth. The alarm was placed in a wristwatch (fig 1:2), and making it attractive for the child to accept and wear them. The child was followed for 5 months and they found that there is decreased frequency of thumb sucking followed by discontinuing the habit totally by 5 months. But the child was instructed to continue wearing the device for six more months to avoid relapse of the habit and malocclusion¹¹.



Figure 3:1

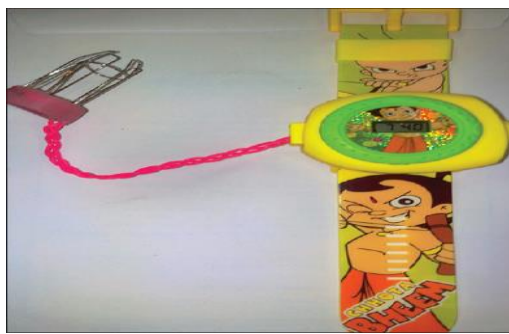


Figure 3:2



Figure3:3



Figure 2:4



Figure 1:3

Figure 1:4

The electronic habit reminder costs about 500 rupees only which is very much affordable, and thus, it is highly cost-effective compared to the other appliances used in the management of nonnutritive sucking habits. Cessation of the habit was noted in 5 months and to prevent relapse of the habit the appliance was continued for another 6 months. The patient is having issue in wearing removable appliance but they did not have any complaint regarding this appliance and was well-accepted. Discomfort in wearing or psychological effects such as teasing have not been noted during the period of treatment.

Revised Three Alarm System¹²

A study was done in 2015 by Ragavendra M Shetty, a 9 years old child with a chief complaint of thumb sucking. Extraoral examination revealed exceptionally clean and chapped left thumb with keratinisation and callus formation. Intraoral examination revealed a mild open bite due to prolonged thumb sucking habit. It was decided to treat the patient by placing a modified RURS' elbow guard to stop the habit, as it restricted the movement of thumb from reaching the mouth and the device also would alarm the child not to suck the thumb. An impression of the elbow was made, and a clean cast was obtained (fig 4:1). Then two layers of modeling wax were adapted well to the cast which acted as a spacer for placing the switch (fig 4:2). Acrylisation was done by using self cure acrylic resin. A musical chip with speaker was incorporated carefully on the outer side of the acrylic elbow guard during the period of acrylisation. Spacer was removed. the switch button was placed in the inner side of the acrylic elbow guard (fig 4:3), and was covered with a layer of sponge. The sponge helps in cushioning and to allow limited movements of the elbow. A envelop type cover with a zip and velcro strap was stitched over the acrylic elbow guard for retention of the appliance and delivered it to the child (fig 4:4). So, whenever, the child tries to suck the thumb or digit the switch button was pressed by the elbow joint and music would play loud. Thus reminding the child to stop the habit. He was recalled for follow-up at one month intervals, for 5 to 6 months. The appliance was removed at the end of 6 month after his mother mentioned that the habit was broken. At school there may be a disturbance due to music, so the vibration chip used in mobile phones can be used so that vibrates the elbow guard which remind the child not to suck the thumb/digit. A siren or a sound which a child is scared off easily also can be incorporated to remind or alarm the child to stop the habit. During clinical observations it is observed that the patient easily accepts the treatment.



Figure 4:1



Figure 4:2





Figure4

Figure 4: 1 shows the intraoral view with mild open bite and elbow impression is taken; 2 shows the Cast obtained from the impression and Two layers of modelling wax adapted over the cast as a spacer; 3 show the Acrylic elbow guard with musical chip and speaker on the outer surface of acrylic elbow guard and Acrylic elbow guard with switch button on the inner surface of the acrylic elbow guard; 5 show the Acrylic elbow guard after placement of a layer of sponge and Patient wearing modified RURS' elbow guard [12]Figure 3: 1 shows the premanagement view; 2 shows the electronic extraoral habit remainder; 3 shows the electronic habit device delivered; 4 shows the post management

examination. It was decided to correct her thumb-sucking habit using the new innovative habit-breaking appliance by using LED lights.

First an alginate impression is made and cast is poured. Normal upper hawleys appliance is made. Acrylization is done in such a manner that the whole assembly of this circuit gets embedded within the acrylic baseplate except the LED bulb and the on-off switch. While doing acrylization, just behind the upper central incisor the LED bulb is placed (fig 5:1). The on-off switch is placed at a point, which is most likely to be touched by the thumb/digit/tongue of the patient while executing the habit. Caution should be taken while doing the acrylization, so that no part of the battery or wire circuit is exposed to the oral environment. Taking care of LED bulb and the switch, the appliance is then finished and polished as a regular acrylic appliance.

The wear time of the appliance was kept the same as that of any other conventional habit-breaking appliance. This appliance is based on the neuromuscular response. This appliance is less mechanical and more psychological approach.

The advantages of led habit breaking appliances are it is easy to prepare and maintain, inexpensive, it does not hurt the patients like the other conventional appliances, and is effective in reminding the patient about the habit, as the button can emit the light by mere touch of the tongue or the thumb.

The main disadvantages of the device are compliance of the patient is required, and battery shelf-life might be a problem.



Figure5:1



Figure5:2

SUMMARY

Digit sucking has been observed during in-utero foetal X-ray studies. It may commence spontaneously in the first two years or it may arise during a teething period or a time of emotional trauma¹⁴. So to identify the root cause and early intervention is required. Though there are many conventional methods newer methods with electronic devices are always welcomed. Alarming wrist watch consist of a chip which senses when the child is biring his / her hand to mouth and it produces the sound or vibration.

This remains the child to not do it. The next device discussed are revised three alarm system. In which the elbow strap is made along with sensor chip. The elbow strap restrict the hand movement and the sensor chip produces the alarming sound. By this the child gets aware and restrict from doing it. The last device discussed is LED in habit breaking appliance. This is an intraoral device which has sensor chip. Here when the places thumb or digits the sensor button gets on and it turns on the LED light. So this makes the child not want to get attention from the peer groups. Hence the child will be conscious. This helps in withdrawing the habit.

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