Original Research Article

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Success of clinical interventions for cessation of thumb-sucking habit in children: An interventional study

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Abstract

Context: Digit-sucking is a prevalent developmental occurrence in pre-adolescent children. While deemed typical behavior in youngsters up to 4 years of age, prolonged thumb-sucking has been linked to dental issues, social embarrassment, and parental concerns.

Aims: The study aims to evaluate the efficacy of treatment therapies for the cessation of thumb-sucking behavior in children.

Setting and Design: This study determines which interventional technique works most effectively for the cessation of the finger sucking habit.

Materials and Methods: An interventional study, a non-blinded randomized trial, was carried out on children of age group 6–10 years with thumb-sucking habit, who reported to the outpatient wing of the tertiary dental settings to compare three different management modalities for thumb-sucking intervention, which were: Psychological therapy involving motivational interviewing/counseling, appliance therapy oriented toward malocclusion correction and appliance therapy targeting habit intervention only.

Results: Comparing the success of these three clinical interventions for cessation of thumb sucking habit, the psychological approach was found to yield the best results. Patient satisfaction with the intervention was found to be highly significant for the psychological approach when compared to appliance therapy. Patient/parent satisfaction for the intervention was found to be highly significant for the psychological approach when compared to appliance therapy.

Conclusion: Even though various clinical interventions for cessation of thumb sucking are available, the psychological approach involving motivational interviewing/counseling was found to be a simple, cost-effective, and essential aid for managing thumb-suckers.

Clinical Significance: This study emphasizes the importance of understanding the child's emotional background in habit intervention protocols

Keywords: Appliance therapy, interventional study, psychological approach, thumb sucking

Introduction

A habit is a consistent behavior established by repeated actions.[1] Thumb or digit sucking is a prevalent developmental occurrence in pre-adolescent children. Prior studies have revealed that the prevalence of thumb sucking exceeds 50%.[2] The incidence of this practice diminishes

with advancing age, typically ceasing at 4 years of age.[3] While some oral habits may continue or emerge later in a child's development, individuals of average intelligence rarely engage in thumb sucking. Nevertheless, parents frequently express anxiety if the practice continues as the kid matures, potentially leading to substantial dentofacial alterations.

For youngsters aged 4 years and older, thumb-sucking has been linked to dental issues, social shame, and parental concerns.[4] Parents seeking to diminish their child's thumb-sucking habit through home remedies and repeated admonitions may unintentionally reinforce the behavior through positive or negative reinforcement, establishing a pattern that could serve as a model for the child's siblings to seek attention. Consequently, from developmental, social, and orthodontic viewpoints, chronic frequent thumb-sucking during children may lead to enduring adverse effects.

A diverse array of strategies and interventions has been delineated for addressing the thumb-sucking habit, encompassing restraints and elimination of access to the soothing object, utilization of orthodontic appliances to directly disrupt the habit, application of aversive-tasting substances to the digit, alarm chimes during the act, and behavior modification techniques. Nonetheless, numerous these methods are considered distasteful for the child. The therapies are expected to vary in terms of their efficacy in habit cessation, child adaptability, ease of implementation from a parent or carer standpoint, duration required to eliminate the non-nutritive sucking behavior, and the degree of malocclusion reduction.[5]

Numerous interventions have been documented in the literature to aid children desiring to cease the habit and to support parents seeking guidance on this matter. Nonetheless, it remains uncertain which options are the most efficacious, or even if they are effective, and which are preferred by children and parents.

This study aimed to compare the efficacy of treatment therapies for the cessation of thumb-sucking habits in children. The aim was to ascertain which intervention strategy employed in the study is most efficacious for the cessation of thumb-sucking and how parents and children evaluated the techniques.

Materials and Methods

An interventional randomized trial was carried out on children of age group 6–10 years with thumb sucking habit, who reported to the outpatient wing of the department of pediatric and preventive dentistry in tertiary dental settings. Apart from the primary complaint of the parents, children who had obvious signs of severe thumb/digit sucking, like anterior open bite, proclination of upper anterior along with retroclination of lower anterior, callus formation on the digits and also children who were indulging in the habit even during school hours, as notified to the parents, by the teachers were included. Although all patients were offered professional management of thumb-sucking, parents who were not willing to give consent and patients who were not willing to give assent for the study, patients below 6 years of age, differently abled children, children from estranged families and the single-parent child were excluded.

- Sample size is calculated using the formula $n = (Z_\alpha + Z_\beta)^2 * 2\sigma^2/d^2$
- Where $Z_\alpha + Z_\beta = (1.96 + 0.84) = 2.8$, σ^2 is the population variance, and d is the difference of means that would like to detect.
  $n = (2.8)^2*2*(7.8)^2/10^2 \sim 10$ in each group.[6]

The methodology employed in the study adhered to the ethical criteria established by the Institutional Ethics Committee (IEC/R/29/2018/DCT/21-12-2018). Verbal and written consent of parents and assent of children were obtained. Every child satisfying the research criteria were recruited in the study till the sample size of 30 was obtained. A detailed medical and dental history was obtained from each patient. Study population was divided into three intervention groups as following.

- Group1: Motivational interviewing/counseling
- Group 2: Appliance therapy oriented toward malocclusion correction

- Group 3: Appliance therapy oriented for habit intervention only.

Motivational interviewing/counseling was carried out by the senior most faculty of the department and it involved the child, siblings and both the parents. In Group 2, patients were explained that the primary intention of the appliance was an esthetic correction, with less emphasis being placed on habit intervention. In Group 3, patients were informed that the appliance was to intervened thumb sucking habit. Parents of all participants of the study were asked to keep a diary indicating the frequency of thumb-sucking, which was evaluated during, as well as pre and post-intervention period.

Results

Thirty study participants were randomly and evenly allocated to three intervention categories (10 participants/group) through block randomization. The collected data were input into Microsoft Excel (Microsoft Corporation) and analyzed using Statistical Package for the Social Sciences software version 26.

In each group, male and female patients were equally distributed, and the age ranged between 6 and 10 years. All the groups were well balanced with respect to age and gender. In Group 1 (psychological management), all cases (90%) showed complete cessation of finger sucking habit except one, which lost follow-up. Immediate cessation of the habit (within 1 week) was noticed in five cases. The rest of the cases had cessation of thumb sucking within 1 month. In Group 2 (appliance therapy oriented toward malocclusion correction), 7 (70%) cases showed complete cessation of finger sucking habit, over 6 months. Out of these seven, only one patient had achieved habit cessation by 1 month.Three patients took up to 3 months, and three patients took >3 months for complete cessation of the habit. In Group 3 (appliance therapy oriented for habit intervention only), 6 (60%) cases showed complete cessation of finger sucking habit over 6 months, and all of them took >3 months of intervention for complete cessation of habit. The cessation of habit between the groups was compared by a one-way analysis of variance test, which was found to be highly significant ($P < 0.001$). Based on the Likert scale, parents as well as patients of Group 1 were found to be highly satisfied with the intervention when compared to other groups.

Discussion

The non-nutritive sucking habit may be seen as an initial phase in the child's development of self-regulation and emotional control. Thumb-sucking is a type of non-nutritive sucking that can begin as early as the 29th week of gestation, is widely observed in infants, and typically peaks between 18 and 21 months of age.[3] A study conducted in Italy by Ferrante and Ferrante indicated that thumb-sucking behavior was began to stimulate the nasopalatal receptors and achieve muscle equilibrium to alleviate emotional and physical tension.[7] Consequently, thumb or digit-sucking appears to be intricately linked to a child's psycho-emotional development. Lubitz[8] stated that children engage in thumb sucking as a result of developmental issues and environmental disruptions, and that it serves as a means of relaxation for numerous children. The majority of youngsters abandon this practice by approximately 4 years of age, coinciding with the emergence of more advanced capacities for self-management. Thumb-sucking may influence dentofacial growth based on the frequency, severity, and duration of the habit. The timing of the force applied to the thumb/digit is more significant than its magnitude, and the resting pressure exerts the greatest influence on the tooth's location.[9] All efforts should be undertaken to address extended finger or digit sucking habits. A chronic digit-sucking habit that remains unaddressed may result in significant deformities and injuries of the digit, as well as dental malocclusions, including anterior open bite, protruded maxillary anterior teeth resulting in increased overjet, retruded mandibular incisors, posterior crossbite owing to transverse maxillary deficiency, and a heightened risk of skeletal class-II malocclusions. The child's swallowing habit and speech could be additionally impacted.

It has been proposed that children cultivate sucking habits to alleviate psychological stress and facilitate sleep by withdrawing from their surroundings. Digit-sucking may produce sensory deprivation, as repetitive and monotonous stimulation of the oral senses can diminish sensory receptors in the mouth. This deprivation results in the deterioration of perception, cognitive capacity, and motor coordination. Recognizing and identifying a digit-sucking habit is the initial stage in its effective control. A comprehensive medical and social history must be obtained before an evaluation. The commencement, extent, duration, frequency, impact of school and home setting stressors, attitudes of both children and parents, and additional habits should be investigated.[2] Consequently, a comprehensive understanding and precise perspective of the digit-sucking habit can be attained. The child's motivation for habit cessation additionally needs to be assessed. In certain instances, it may be advantageous to conduct a private session with the youngster in the absence of parents. Both the treating physician and the parents must recognize that the treatment will be ineffective unless the child acknowledges the habit and possesses intrinsic motivation to discontinue it. The therapy could be presented to the child as a supportive measure rather than a punitive action, aimed at providing psychological assistance for adjustment.

The present study assessed the efficacy of clinical therapies for discontinuing thumb-sucking in children to identify the most effective strategy. In Group1 (psychological management), on the day of appointment, the patient along with both the parents were asked to report early morning for an orientation and questions–answers session. First, information focusing on the psychological background of the child was collected through different sessions of discussion with child alone, as well as with parents. The counselor gained the trust of the child, by interacting in the most appropriate manner suitable for that child and the child would narrate the routines of his/her life.

Events that may cause hurt/sadness/insecurities are specially noted by the counselor. Suggestions for any changes are taken from the child also. No content of the interview between the counselor and the child is disclosed to anyone. It is based on this, a trust developed between the patient and the counselor. Counselor then explained to the parents, about the inferences of the interview with the child, initially in the absence of the child and later in the presence of both the parents and the child. After the discussions and suggestions for changes, a reward-based positive reinforcement protocol was recommended to individual children, based on their needs, requirements and parental willingness. The rewards ranged from things as trivial as taking an active interest in the child's activities, to gifts such as a fishbowl, a bicycle, non-curricular as well as curricular aids provided by the parents. All cases (90%) in this group showed a complete cessation of the habit, follow-up could not be obtained for one patient. This group had the highest success rate and the fastest time of achieving habit cessation. All cases had complete cessation of thumb sucking within 1 month. Immediate cessation of habit (within 1 week or less) was achieved in five cases.

Bertoldi *et al*.[10] concluded that the counseling interview favored the interruption of the oral habit and the correction of the open bite. A drawback of motivational therapy is that it requires complete involvement of the parents as well as the child and the need of regular and direct attention of a counselor well versed in the behavior and emotions of children. Intellectually challenged children may not be ideal candidates for motivational interviewing. However, there is no harm in trying motivational therapy in all children.

In Group 2 (appliance therapy for malocclusion correction), various designs of removable palatal cribs were employed to inhibit ease of digit positioning against the palate and any concomitant tongue thrust, therefore facilitating the inherent force of the lips to rectify an anterior open bite. In this group, patients were explained that the primary intention of the appliance was an esthetic correction, with less emphasis being placed on habit intervention. This was done to divert the attention of the child from the habit and to avoid

any probable negativity toward habit interception, related to previous home remedies attempted. In this study, 7 (70%) cases in this group showed complete cessation of finger-sucking habit within the study period. The results of Group 2 were better than Group 3 although statistically insignificant. The time taken for habit cessation was found to be statistically significant than Group 3, with only three cases taking more than 7 months for complete habit cessation. The better results of Group 2 over Group 3 could be attributed to the fact that esthetic concerns are taken up more seriously by individuals of all ages. Although the results are inferior to Group 1, the advantages lie in concurrent management of malocclusions and a more flexible schedule for the operators, the child, and the parents.

Tanny *et al*.[11] involved patients aged 4–12 years exhibiting dental habits, who were treated with stomahesive wafers applied to the incisive papilla to direct the tongue to maintain that position. The results of this investigation illustrated the therapeutic significance of notice of intent in the termination of digit-sucking habits, the closure of anterior open bites, and a decrease of overjet. In Group 3, appliance therapy oriented toward habit intervention, removable palatal cribs were used as well. Although the children were explained in detail about the need for habit cessation, only 6 (60%) cases showed complete cessation of finger-sucking habit by the termination of the study period, and all of them took >3 months of intervention for cessation of habit, which was the poorest among all the groups.

Fixed appliances were not included in the study, as the compliance of the child and the parent does not play a pivotal role in those and often the root cause of the problem remains unaddressed. Motivational interviewing gives a better insight into the child's problems and provides beneficial results across all spectrums of the child's life. Removable appliances also have a cost advantage and can be used to intercept the habit, as well as concurrently manage malocclusions affordably and acceptably for a wide range of the population. Although not included in the study, fixed habit breakers were found to be highly valuable aids in habit interceptions in individuals with intellectual disabilities, where appliance therapy is feasible. The cases classified as failures during the research period required management through a combination of alternative strategies. A 2015 Cochrane study indicated that the use of orthodontic braces, psychological interventions (including positive or negative reinforcement), or a combination of both, was more effective in achieving habit cessation compared to no therapy.[5]

Among the three clinical approaches for the cessation of thumb sucking, the psychological approach demonstrates the most favorable outcomes. The majority of children aged 4–10 who engage in thumb-sucking can be addressed through grievance resolution, reassurance, positive reinforcement, and gentle reminders. Throughout any intervention aimed at modifying habitual behaviors, parents must furnish the child with sufficient emotional support and genuine concern. Parents should strive to alleviate their child's insecurities. Fundamentally, offer alternatives to thumb-sucking that instill a sense of security during early development, to prevent the practice from evolving into a coping mechanism for stress in later life stages.

The diagnosis and evaluation of abnormal habits and their immediate and long-term effects on the craniofacial complex and dentition should occur as early as feasible to mitigate potential detrimental impacts on the dentomaxillofacial or dentofacial complex.[12-14] Thumb sucking can adversely affect muscular function and facial developmental patterns in youngsters, as well as hinder growth and development in the dentomaxillofacial region. Effective intervention of thumb sucking and other oral habits in youngsters fosters appropriate growth patterns, so improving existing malocclusions and reducing the likelihood of future dental misalignment. Consequently, priority is given to prompt detection and intervention.[15]

Based on the Likert scale, patient/parent satisfaction with the intervention was obtained from all the

participants included in the study. It was found that patient/parent satisfaction from the psychological approach was highly significant (P = 0.0001), when compared to the other two mechanotherapy approaches.

Conclusion

Even though various clinical interventions for cessation of thumb sucking are available, the psychological approach involving motivational interviewing/counseling was found to be a simple, cost-effective, and essential aid for managing thumb-suckers. Although it might not feel like everyone's cup of tea, a Pedodontist with a good understanding of the child's behavior, in collaboration with the parents, can successfully employ the psychological approach for managing digit-sucking habit and thereby play a significant role in the general well-being of the child.

Clinical significance

This study emphasizes the importance of understanding the child's emotional background in habit intervention protocols. Further studies with other habit interception techniques may be required to determine the long-term effects of these interventions.

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