

A comparative study of RURS elbows guard and intraoral crib appliance in management of thumb/digit sucking habit in children with and without mental retardation.¹Dr. Anushka Deoghare, ²Dr. Raghavendra M Shetty¹Department of Pedodontics and Preventive Dentistry, Sundra, Rajnandgaon.

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²Department of Preventive and Pediatric Dentistry, Assistant Professor, College of Dentistry, Gulf Medical University, Ajman, United Arab Emirates.**Correspondence Author:** Dr. Anushka Deoghare, Department of Pedodontics and Preventive Dentistry, Sundra, Rajnandgaon, Reader, Chhattisgarh Dental College and Research Institute and Pt. Deendayal Upadhyay Health Sciences and Ayush University, Rajnanadgaon, India.**Type of Publication:** Original Research Paper**Conflicts of Interest:** Nil**Abstract****Objective:** To compare the efficacy of RURS elbow guard and intraoral crib appliance in children having thumb/digit sucking habit with and without mental retardation.**Materials and Method:** Group I included 15 children having thumb/digit sucking habit without mental retardation and were treated with intraoral crib appliance, Group II included 15 children having thumb/digit sucking habit without mental retardation and were treated with RURS elbow guard and Group III included 15 children having thumb/digit sucking habit with mental retardation and were treated with RURS elbow guard. Each child was examined for lip competency, lateral profile, overjet, openbite. Callus formation and any deformity in thumb or finger were noted. Regular follow up was done and duration to stop the habit was noted.**Results:** The mean age of the children in Group I and Group III were 10.2 ± 1.89 years and 11.2 ± 2.86 years respectively, which was higher than that of Group II (5.87 ± 1.50) . The compliance of the patient for RURS elbow guard was better than intraoral crib. The mean duration of appliance therapy in Group I was the least i.e. 142.2 ± 27.4 days, while in Group III it was maximum with 251.0 ± 36.9 days.**Conclusions:** RURS elbow guard may provide an alternative to intra oral habit breaking appliance especially in the treatment of mentally retarded children with thumb sucking habit.**Keywords:** Thumb sucking, Mental retardation, RURS elbow guard, Intra oral habit breaking appliance.**Introduction**Thumb and finger-sucking habits, or nonnutritive sucking, are considered to be the most prevalent of oral habits, with a reported incidence ranging from 13% to almost 100% at some time during infancy.^{1,2} The prevalence of prolonged digit sucking in India varies greatly from 0.7% to 1.9%.^{3,4,5} It occurs as early as 29th week of gestation and persists till preschool age. Persistent finger sucking habit have been related to hunger, need to satisfy a natural

sucking instinct, insecurity or even a desire to attract attention.^{6,7} Thumb sucking if continued over an extensive period of time; do result in deformities of palate, jaw and malocclusion. If thumb sucking has already become a habit, measures must be taken to “break the habit.”⁸

The passive force of the thumb against the palate, the abnormal contraction of cheeks against the side of arch by sucking action leads to narrowing of dental arches.⁹ Malocclusions seen in thumb suckers include retrognathic mandible, prognathic premaxilla, deep overbite, deep palatal vault, narrowing of dental arches and flaccid upper lips.¹⁰ Finger sucking may lead to permanent damage to the digits.¹¹

Various treatment modalities are tried till date for correction of thumb sucking habit but all have certain disadvantages. Especially in case of mentally retarded children, it is difficult to treat the problem. Very few treatment modalities are available for these children, as making an intraoral impression is difficult and usually require general anesthesia.¹² RURS elbow guard and wrist band has been tried for treatment of thumb sucking in mentally retarded children.^{12,13}

No comprehensive studies regarding the comparison and effectiveness of appliance on the stoppage of habit are published in the literature. Hence the primary objective of the present study was to compare the efficacy of RURS elbow guard and intraoral crib appliance in children having thumb/digit sucking habit with and without mental retardation.

Methodology

Source of Data

Thirty children from a total of 1210 patients between ages 3-16 years having thumb/digit sucking habit without mental retardation from the OPD of Department of Pedodontics and Preventive Dentistry were selected for the study.

Fifteen children from a total of 1082 children between ages 3-16 years having thumb/digit sucking habit with mental retardation from various special schools for disabled children were selected for the study. Selection criteria included no trauma or surgery in the elbow region, absence of any bone disorders.

Children having thumb sucking habit without mental retardation were asked to report to the Department of Pedodontics and Preventive Dentistry, with parents. Children having thumb/finger sucking habit with mental retardation were identified and selected in their respective schools. Parents were informed regarding the study and the consents were obtained from them. The study was approved by ethical clearance committee of the institute where it was conducted.

The selected children were grouped as follows:

Group I : A total of 15 children having thumb/digit sucking habit without mental retardation were treated with intraoral crib appliance in the department.

Group II : A total of 15 children having thumb/digit sucking habit without mental retardation were treated with RURS elbow guard in the department.

Group III : A total of 15 children having thumb/digit sucking habit with mental retardation were treated with RURS elbow guard in their respective schools in the presence of their respective class teachers and psychologist.

An attempt was made to treat

Group IV comprising of mentally retarded children with thumb sucking habit with fixed intra-oral crib appliance. But due to unavailability and non feasibility of general anesthesia set up near the special schools, poor patient and parent cooperation, this group had to be eliminated from our study.

Each child was examined for lip competency, lateral profile, overjet, openbite if any. Presence or absence of

lisping was also recorded during speech. Callus formation and any obvious deformity in thumb or finger sucking were noted.

Fabrication of Intraoral Crib

For Group I children, band adaptation was done on maxillary permanent first molars/deciduous second molar. An alginate impression of the maxillary arch was made with the bands seated and the cast was obtained. Lower impression was also made as a reference to position the palatal crib properly. The palatal arch wire component was passive with 0.5-1mm of relief from the palatal tissue. The crib was positioned in the intercanine area and extending beyond the occlusal plane and was soldered to the bands. The appliance was then cemented with luting glass ionomer cement. The children were recalled for follow up every month.

Fabrication of RURS Elbow Guard

The elbow guard was fabricated by the technique given by Shetty et al (2010).¹³ An impression of the elbow was made with putty impression compound and a cast was obtained. Two layers of modelling wax were adapted to the cast, which acted as a spacer. Acrylization was performed using self-cure acrylic. The spacer was removed and was replaced by a layer of sponge for cushioning and to allow limited movements of the elbow. A cover with velcro strap was stitched over the acrylic elbow guard.

Inter-appointment frequent reminders and reinforcement via telephonic conversations were provided to the child/child's care taker regarding the regular use and handling of the appliance. The children were recalled for follow up every month and the compliance was checked in the department for children with thumb/finger sucking without mental retardation i.e. Group II.

For Group III also, inter-appointment frequent reminders and reinforcement were provided to the class teachers and

psychologist of their respective schools regarding the regular use and handling of the appliance. Children were visited in the respective schools personally every month for follow up and motivation.

Clinical Criteria for Success of Habit-Breaking

- After insertion or placement of the appliances, any history of habit-breaking was determined from the participant and their parents/ class teachers to verify success of habit-breaking treatment.
- The participants were contacted and examined every month.
- Success of a habit-breaking appliance was marked when the habit was eliminated.
- Partial success of treatment was marked when the habit was mostly reduced but the subject still sometime indulge in the habit or when there is some compliance issue with wearing the appliance.

After cessation of habit, the children were asked to continue wearing the same appliance for a period of two months as retention phase.

Results

The mean age of the children in Group I and Group III were 10.2 ± 1.89 yrs. and 11.2 ± 2.86 years respectively, which was higher than that of Group II (5.87 ± 1.50). The difference of mean age across groups was highly significant with p-value < 0.001 (Graph 1).

The data on working status of parents was also obtained considering it as one of the risk factors of the habit. Table 1 provides the distribution of children according to working status of their parents in the respective groups. In the study sample, all 45 children had their father working. There were 14 (31%) children who had non-working mothers, while 31 (69%) had working mothers. In all the treatment groups, majority of children had both parents working. The association between working status of parents and treatment groups was statistically insignificant

as indicated by p-value of 0.999. In other words, the working status was similar in all the three groups.

The number of children according to type of feeding in the study group revealed that 5 (11%) children were exclusively breast fed, while 31 (69%) were exclusively bottle fed. There were 9 (20%) children fed on both breast and bottle. In each group, the proportion of exclusively bottle fed children was higher than that of other two types. However there was no statistical significance ($p > 0.05$) seen across the group (Table 2).

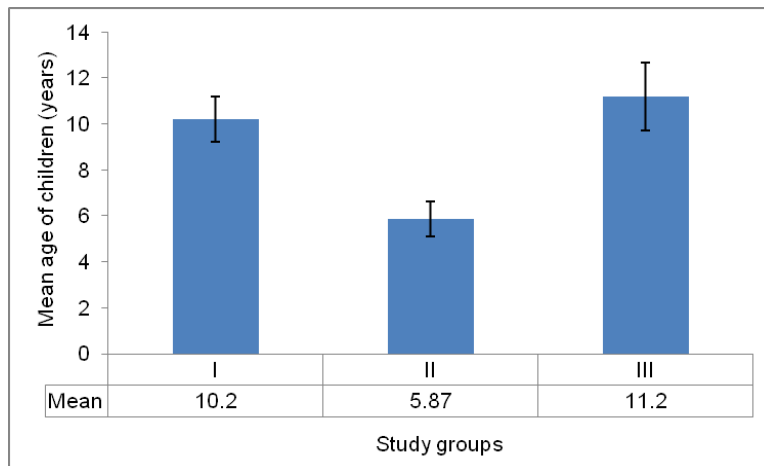
The compliance observed in the study groups are illustrated in Table 3. In Group I, maximum i.e. 12 (73%) children showed *fair* compliance, followed by 2 (13%) with *good* compliance. However, in Group II and Group III, the compliance was either *good* or *very good*. In these Groups, majority i.e. 17 (57%) showed *very good* compliance, followed by 13 (43%) showed *good* compliance indicating a better compliance for RURS elbow guard.

As Group I children were delivered with intraoral appliance 15 (100%) children were wearing it for 24hrs. Majority, i.e. 8 (53%) children wore appliance for 7-10 hrs per day in Group II and Group III (Table 4).

The mean duration of appliance therapy in Group I was the least i.e. 142.2 ± 27.4 days, while in Group III it was

maximum with 251.0 ± 36.9 days. The difference of mean duration was statistically highly significant (Table 5). A pair wise comparison was performed using Tukey's HSD, which resulted into highly significant difference between Group I and Group II with adjusted p -value < 0.0001 . Also the difference of mean duration between Group I and Group III was highly significant with p -value < 0.0001 . The difference between Group II and Group III was significant with p -value of 0.041.

The mean duration of appliance therapy was calculated in hours for three treatment groups to check the effective treatment time. Mean duration of hours for Group I was the highest i.e. 3412.8 ± 657.34 hour, while for Group III was the lowest i.e. 1913.5 ± 658.58 hrs (Table 6). The difference of mean duration across groups was statistically significant with p -value < 0.0001 according to one-way analysis of variance. Pair wise comparison of means was performed using Tukey's HSD test, it revealed that difference of means between Group I and Group II, as well as difference in Group I and Group III was statistically significant with p -value < 0.0001 . However, difference between Group II and Group III was statistically insignificant with P -value of 0.6706.



Graph 1: Bar Chart with Error Bars Showing Mean Age of Children in the Study Groups

Table 1: Distribution of Children as per Working Status of Parents in the Study Groups

Working status of parents	Groups			Significance*	
	I (n=15)	II (n=15)	III (n=15)	χ^2	p-value
Father (W); Mother (NW)	4 (27%)	5 (33%)	5 (33%)	0.207	0.999
Both working	11 (73%)	10 (67%)	10 (67%)		

*Using Chi-square test

Table 2: Distribution of Children as per Feeding in the Study Groups

Feed	Groups			Significance*	
	I (n=15)	II (n=15)	III (n=15)	χ^2	p-value
Breast	2 (13%)	2 (13%)	1 (7%)	2.851	0.651
Bottle	12 (80%)	9 (60%)	10 (66%)		
Both	1 (7%)	4 (27%)	4 (27%)		

*Pearson's Chi-square with simulated p-value based on 2000 replicates

Table 3: Distribution of Children as per Compliance in the Study Groups

Compliance	Groups		
	I (n=15)	II (n=15)	III (n=15)
Fair	12 (73%)	0	0
Good	2 (13%)	6 (40%)	7 (47%)
Very good	1 (7%)	9 (60%)	8 (53%)

Table 4: Distribution of Children as per Appliance Worn per day in the Study Groups

Appliance worn / day	Groups		
	I (n=15)	II (n=15)	III (n=15)
4 - 6 hr	-	1 (7%)	5 (33%)
7 - 10 hr	-	8 (53%)	8 (53%)
11 - 14 hr	-	6 (40%)	2 (13%)
24 hr	15(100%)	-	-

Table 5: Duration of Appliance Therapy across the Study Groups

Parameter (Duration of appliance therapy)	Groups			Significance	
	I (n=15)	II (n=15)	III (n=15)	F-value	p-value*

Mean ± SD [Median] (in days)	142.2 ± 27.4 [155]	217.6 ± 42.7 [200]	251.0 ± 36.9 [240]	35.43	< 0.0001**
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** Highly significant

Table 6: Duration of Appliance Therapy in Hours across the Study Groups

Parameter (Duration of appliance therapy in hours)	Groups		
	I (n=15)	II (n=15)	III (n=15)
Mean ± SD	3412.8 ± 657.34	2110.17 ± 567.14	1913.5 ± 658.58
Median	3720	2250	1955
F-value	25.16		
P-value*	< 0.0001**		

Discussion

In previous reports, several methods have been demonstrated for the treatment of finger-sucking habits; these methods can be classified as (1) preventive therapy and (2) appliance therapy.¹² Preventive methods include the application of a bitter solution or adhesive tape and wearing a socks, glove, mitten, thumb guard, or long-sleeve gown.^{14,15} Appliance therapy includes the use of fixed or removable habit breakers designed to make the sucking habit difficult or unpleasant.¹⁴ Age-appropriate explanations to the child and positive reinforcement are other treatment possibilities for digit suckers and are also necessary for the success of clinical management.¹⁶

Some of the methods presented above have a number of reported disadvantages. Clinical experiences have revealed that a bitter solution usually has a limited effect.¹⁷ Application of adhesive tape may cause sweating or infection and may also have the risk of reducing blood circulation¹⁸ while the items worn on the hand can easily be removed involuntarily during sleep. Alteration of the child’s pajamas to prevent the movement of hand to mouth usually increases the child’s frustration and wakefulness¹⁹; additionally, the pajamas method can be used only if the habit is done during sleep.¹² With the use

of fixed orthodontic habit breakers, decalcification of enamel surfaces, increased tendency for caries, and gingival inflammation may occur; and removable appliances need patient cooperation. Another disadvantage of intraoral appliances is the deviation in speech and pronunciation.¹⁷ Recently in the literature acrylic shield tied to the wrist of the thumb sucking patient¹² and RURS elbow guard have been used successfully in treating the child with mental retardation.¹³

The age group of the patients selected for the present study was between 4-15 years. The sucking habit is considered abnormal if persists beyond the age of 3 years²⁰. It should be corrected, or it may lead to severe dental or skeletal abnormalities. In the present study, the difference in the mean age of the patients was statistically significant among three groups as Group II children were treated with RURS elbow guard were of younger age. The acceptance of the RURS elbow guard appliance was better even in younger patients. However fixed intraoral crib have certain disadvantages like difficulty in band adaptation on partially erupted permanent molars and bands on second deciduous molar may deviate path of eruption of permanent first molar. Hence the children of younger age group were treated with RURS elbow guard,

as it was convenient appliance to fabricate than the intraoral crib appliance.

In the present study, out of 45 children with thumb sucking habit, both mother and father of 31 children were working. Thus 69% of the parents in our study were working. These findings were concurrent with the finding of Al- Dawoody.²¹ This shows that sucking habit is commonly observed in children with working parents. Such children may have feeling of insecurity so they use their thumb to obtain a secure feeling.

Sucking is the first coordinated muscular activity of infant. A natural sucking instinct leads some babies to suck their thumbs during the first few months of life.²² Children who do not have access to breast feeding or are bottle fed may satisfy their instinctive sucking urge by sucking their thumb. Our study shows that the exclusive bottle fed children (69%) were more prone to have thumb/finger sucking habit while exclusive breast fed children were only 11% and those with both feeding pattern were 20%. Similar findings were observed by Farsi and Salama (1997),²² Suzely et al (2008),²⁴ de Holanda et al. (2009).²⁵ However in contrast to the present study Moimaz et al. (2012) found no association between breast feeding and thumb sucking.²⁶ Traisman and Traisman (1958)²⁷ and Hanna (1967)²⁸ also found no correlation between thumb sucking and mode of feeding. Long period breast feeding makes the risk of non nutritive sucking habits lower.²⁹

In the present study, all the children treated with RURS elbow guard had good compliance when compared to intraoral crib. This may be due to fact that intraoral crib could have created difficulties during eating and speech. Similar findings were reported by Bengi et al.¹² Palatal cribs are not always successful, and are at risks of poorer oral hygiene, decalcification and caries around bands, retarded eruption of banded teeth, and soft tissue

damage.³⁰ One of the interesting finding of our study was that the children accepted the RURS elbow guard easily. Many children perceived it something like a wrist band; some thought themselves to be fashionable/ stylish with a sporty wear. Elbow guard does not create difficulties during speech and chewing.¹³ It was also loose enough to allow limited movement and sufficient blood flow. RURS elbow guard showed success even in child with primary dentition.³⁰

In Group III, the children were mentally retarded, so elbow guard gave additional advantage as general anesthesia was not required to make impression. These patients already have difficulties in pronouncing words. The intraoral appliance could impede speaking in normal children, is thought to be more inconvenient in mentally retarded children.²⁶ On the contrary it was easy to make impression of elbow without general anesthesia. Preparation of elbow guard appliance was simple, economic and did not affect oral hygiene negatively. Caries levels are reported to be higher among disabled children because oral hygiene is usually poor and intraoral habit breakers make it worse.³¹

As the results were observed, we fell under the dilemma that, whether the success of the appliance should be based on the number of days or total no. of hours worn for the cessation of thumb/finger sucking habit. If number of days is taken into consideration the appliance worn for the minimum days will show a better success and if the hours are considered, the minimum hours in which the appliance has ceased the habit will show the better success.

When duration of days were taken into consideration, it was observed that longer duration was required for RURS elbow guard to cease the habit when compared to intraoral crib (Table 5).

When duration of hours were taken into consideration, it was observed that lesser time was required for RURS

elbow guard to cease the habit when compared to intra-oral crib (Table 6).

This contrary result can be attributed to the type of fixed intra oral appliance used in the study. Intra-oral crib was fixed, so it was worn for 24 hours a day, where as RURS elbow guard was an extra oral removal appliance requiring its removal during eating. RURS elbow guard required parent/teacher/psychologist monitoring especially in Group III, hence were used during the school timings.

Interesting finding was seen when number of mean hours was calculated for both intra oral and RURS elbow guard (Table 6). Results showed that active duration of therapy required (hours) to cease the habit was less in RURS elbow guard. This finding postulates a new hypothesis that, if RURS elbow guard is worn for more duration in a day can reduce the duration of appliance therapy in days. However, further studies on effect of various time-duration of RURS elbow guard for cessation of habit is required.

Conclusions

RURS' elbow guard may provide an alternative to intra oral habitbreaking appliance especially in the treatment of mentally retarded children with thumb sucking habit. However, further studies on effect of various time-duration of RURS elbow guard for cessation of habit is required.

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