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Children's Behavior to Toothbrushing by Parents

TADASHI OGASAWARA, TSUNEYUKI TAKAI, KUMIKO TSUKADA
SUMIKO KOHDA, KEIICHI KOSHIBA, KAZUO HOSAKA
TATSUO WATANABE and HIROSHI KASAHARA

Department of Dentistry for the Handicapped, Matsumoto Dental College
(Chief : Prof. H. Kasahara)

Summary

Clarification of the normal developmental stages with regard to recumbent-position brushing is considered important for the purpose of giving appropriate guidance in teeth cleaning infants. In order to identify the ages at which children may accept recumbent-position brushing, we had a number of mothers perform recumbent-position brushing upon normal preschool children (ages 0-6 years), and observed the children's behavior.

79 children (79.0%), classified as the adaptive group, were seen to have no negative reaction or behavior whatsoever to recumber-position brushing. However, 21 children (21. 0%) composed an unadaptive group in which some rejective behavior was observed.

As a result of analyses by AIC, the calender age which thus distinguishes the adaptive group from the unadaptive group was 2 years and 6 months. It was concluded that children 2 years and 6 months or older are adaptive to recumbent-position brushing while those less than 2 years and 6 months are unadaptive.

Introduction

Because their recognition ability is still poorly developed, children under 5 years old are unable to brush the interior of their teeth thoroughly[1]. Accordingly, the oral hygiene of young children is normally left in care of their mothers or other guardians. To clean the teeth of preschool children, recumbent-position brushing is usually recommended because this makes the interior of the mouth clearly visible and is also generally considered to be comfortable for both the child and the mother[2,3]. Some children, however, show aversion to this position, refusing to open their mouths, crying or otherwise displaying extreme rejective actions, although others remain completely calm and receptive. Several reports have been published on tooth-brushing performed by the preschool children themselves[4~6], but there have been no report on children's adaptability to recumbent-position brushing by their mothers or other guardians.

Clarification of the normal developmental stages with regard to the recumbent-position brushing is also considered important for the purpose of giving appropriate guidance in tooth-brushing.

In order to identify the ages at which children may accept recumbent-position brushing, we had

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a number of mothers give recumbent-position brushing to normal preschool children, and observed the children's behavior. An analytical study was conducted using Akaike's Information Criterion (AIC)[8].

Materials and Methods

1. Subjects Examined

The subjects examined were 100 children under 6 years old and their mothers, the children having been selected from among patients visiting a public dental clinic in Wada village, Nagano Prefecture, during the period from December 1988 to the end of March 1989. The ages of the subjects ranged from 0 to 6 with an average age of 3 years and 10 months (Table 1).

Enjoji's Infant Analytic Development Test[7] was given to these children and it was established that, for all test items, no delay of more than two stages was discovered in the children's development as compared with the average development of children of the same calendar ages.

2. Methods of Examination

Each mothers was instructed to place the child's head on her knees and brush the child's teeth. In principle, the brushing was to be performed for more than 30 seconds. The brushing should be stopped immediately when the child began to show a strong rejective attitude, such as crying or acting violently. The reactions of the children were observed closely and recorded on videotapes. Six observation categories were prescribed for this test : (1) Mouth-opening (does the child shut the mouth or keep it open ?), (2) biting the tooth-brush (yes or no), (3) trying to stop the brushing with the hands (yes or no) (4) moving the head (yes or no), (5) the child, laid on the back, changes the posture during the brushing (yes or no) and (6) crying (cries or keeps calm). Observations were also made of the mothers to see whether they restrained the child's movements while administering the recumbent-position brushing. Such reactions as described in (1) to (6) above were evaluated as having occurred when any of the child's rejective actions, (shutting the mouth, biting the tooth-brush, blocking the brushing with hands, moving the head, changing the posture or crying), or the mother's restraining actions was observed even once.

3. Methods of Analysis

The data obtained for each of the above six items were added up and their distribution observed. Furthermore, subjects in whom one or more rejective reactions were observed with respect to any of the observation categories were designated as belonging to the unadaptive group and those in whom no rejective behavior was observed to the adaptive group.

In order to identify the ages at ages children accept recumbent-position brushing, the data was analyzed by Akaike's Information Criterion (AIC)[8~9]. Where the AIC was found to have a negative value, there was judged to be in a correlation ; the age with the minimum AIC was selected as the

Table 1 : Age

Age	Number of subjects
0 year	5
1 year	12
2 years	11
3 years	19
4 years	23
5 years	18
6 years	12
Total	100

optimum model. The calendar ages of the children were divided into groups of 6-month intervals and a contingency table was constructed for each group. Then, using the AIC, the optimum model was selected and identified as the borderline age.

Results

1. Rejective (Unadaptive) behavior seen at the time of the recumbent-position brushing

1) Children's Behavior

As a result of observing the children's behavior with respect to the six observation categories, the most common rejection behavior was blocking the brushing with the hands, (20/100 children, 20.0%). The second most frequent rejective behavior was moving the head (17 children, 17.0%), followed by change of posture (17, 17.0%), shutting the mouth (15, 15.0%), biting the tooth-brush (13, 13.0%) and crying (13, 13.0%) (Table 2).

2) Restraining behavior by the mothers

Twelve mothers (12.0%) restrained the children's behavior during recumbent-position brushing (Table 3).

2. Adaptability to recumbent-position brushing

The adaptive group with no observed rejective behavior whatever at the time of recumbent-position brushing totalled 79 children (79.0%), while the unadaptive group in which some rejective behavior was observed totalled 21 children (21.0%) (Table 4).

3. Distinguishing ages of adaptability

The calendar age that showed the lowest AIC and which thus distinguishes the adaptive group from the unadaptive group was 2 years and 6 months, with an AIC of −76.7 (Table 5).

The frequency distribution at a calendar age of 2 years and 6 months is shown in Fig. 1. It was thus concluded that children 2 years and 6 months or older are adaptive to recumbent-position brushing while those under 2 years and 6 months are unadaptive (Fig. 1).

Table 2: Frequency distribution of observation items

Item	Category	Frequency (The subject.)
Mouth-opening	shuts the mouth	15 (15.0%)
	keep it open	85 (85.0%)
Biting	yes	13 (13.0%)
	no	87 (87.0%)
Blocking with hand (the brushing)	yes	20 (20.0%)
	no	80 (80.0%)
Head-moving	yes	17 (17.0%)
	no	83 (83.0%)
Posture-changing	yes	17 (17.0%)
	no	83 (83.0%)
Crying	yes	13 (13.0%)
	no	87 (87.0%)

Table 3: Restraining actions by guardians

Guardian's action	Number of subjects
No restraint	88 (88.0%)
Restraint applied	12 (12.0%)

Table 4: Adaptiveness to recumbent-position brushing

Adaptiveness	Number of subjects
Adaptive	79 (79.0%)
Non-adaptive	21 (21.0%)

Discussion

1. Restraints applied at the time of the recumbent-position brushing

At the time of recumbent-position brushing, 21 children showed rejective behavior. Of these, 12 were restrained by their mothers but the remaining 9 were not, despite their rejective behavior.

Whether restraint is applied by a mother or not can be considered as an outcome of the interrelationship between the degree of the child's rejective behavior and the way the brushing is administered by the mother. If the child cries or acts so violently that the mother is unable to administer the brushing, she is inevitably obliged to restrain the child. Some of them, however, restrain even minor rejective behavior in order to brush the child's teeth quickly and well. Although it is desirable, whenever possible, to conduct recumbent-position brushing without making the child cry, some degree of rejective behavior is inevitable in the case of the younger children. If the act of restraint is found to make the child hostile to recumbent-position brushing, promoting his or her

Table 5: AIC in each category

Calender ages	AIC
1 year	− 6.5
1 year and 6 months	−35.9
2 years	−55.4
2 years and 6 months	−76.7
3 years	−56.7
3 years and 6 months	−42.7
4 years	−26.8
4 years and 6 months	−15.8
5 years	−15.2
5 years and 6 months	− 8.7
6 years	− 4.1
6 years and 6 months	0.07

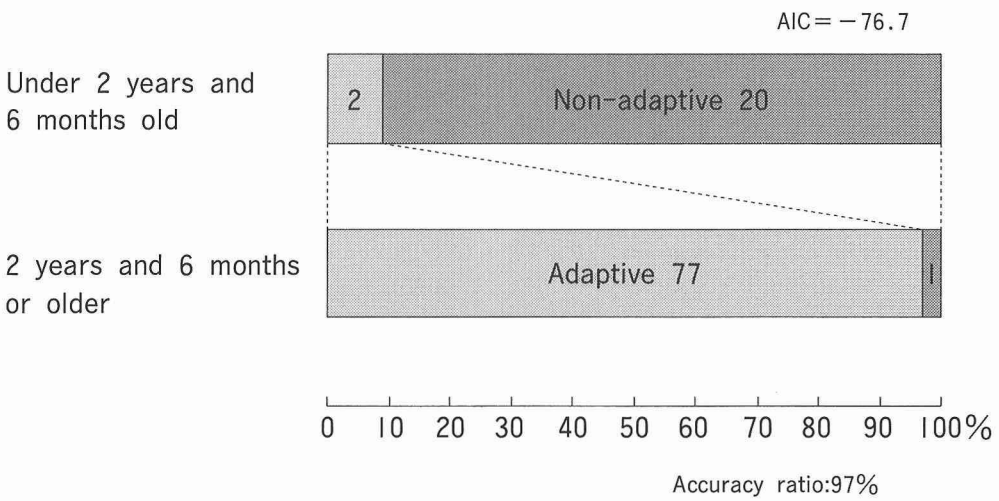

Fig. 1: Distribution chart in the optimum categorization (by calender age)

rejective behavior, one should consider the possibility of abandoning restraint altogether and treating the child more patiently, possibly even playing with him or her during brushing. However, the results of this study suggest that all children, even those who have been restrained habitually during recumbent-position brushing, do become adaptive to this method of brushing once they have reached a certain age.

2. Adaptable ages for recumbent-position brushing

The Figure 2 describes the normal developmental stages for recumbent-position brushing, based on the results of this study. Infants under 2 years and 6 months old tend to be unadaptive to recumbent-position brushing. As a possible cause of this unadaptability, one may also consider such factors as residual hypersensitivity in the periphery or within the oral cavity. It is, however, doubtful that such hypersensitivity remains past the age of two. Rather, due to poorly developed self-restraint, it is likely that some infants are incapable of keeping still for more than a certain period of time. It is said that children must wait for the completion of various development stages before they are able to restrain themselves and suppress their desires even for a while[10]. One such factor is the child's understanding of the outcome of its behavior. Only once a child becomes able to understand that even if its desire will not be fulfilled now, it may be fulfilled later on, can its self-restraint become firmly established. This is said to occur at around the age of two[10]. An infant under 2 years old normally tries to move around or play as its pleases. When given recumbent-position brushing, it cannot tolerate being forced to remain still for even so short a period of time. This is especially marked with the development of the child's ego from the age of 1 year and six

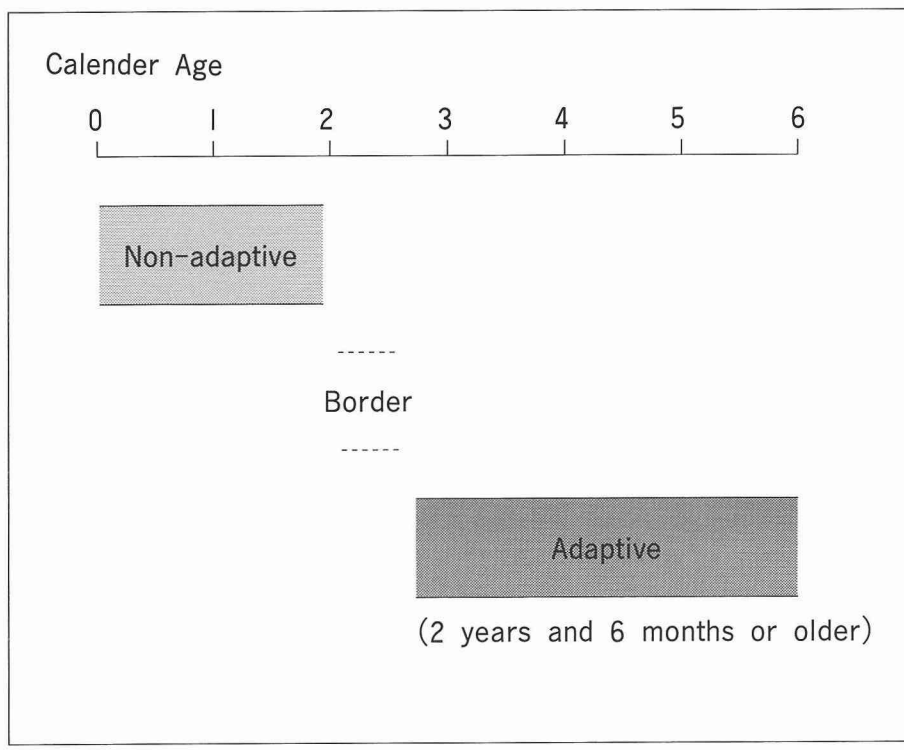

Fig. 2: Chart showing the normal developmental stages in recumbent-position brushing by parents.

months, when children frequently refuse to do what they are told and lose their temper. Although this appears as a troublesome problem from the mother's point of view, actually it is nothing but a normal development process for infants under 2 years and 6 months old. The dentist and dental hygienist should also have an understanding of the unadaptability of children in this age range to recumbent-position brushing. We believe that the kind of guidance which demands adaptability to recumbent-position brushing is inappropriate for infants under 2 years and 6 months old.

However, once a child has passed the age of 2 years and 6 months, he or she should normally possess the ability to understand that recumbent-position brushing will be over in next to no time if he or she just keeps still and that it will not hurt him or her at all. It seems that all children can be expected to adapt to recumbent-position brushing past the age of 2 years and 6 months, when their-restraint has been established.

One girl of 2 years and 10 months old who was a subject in this study surprised her mother by not showing any rejective behavior at the time of the test, despite the fact that, at home, she sometimes expressed dislike for recumbent-position brushing. This case seemed to offer an example of a child who shuts recumbent-position brushing at home because she plays the baby to her parents but could not do so at the time of the test in an entirely different environment. This episode suggested that, even past the age of 2 years and 6 months, when a child can adapt to recumbent-position brushing, some rejective behaviors may be seen at home because of the child's playing the baby to the mother and other oldre member of the family.

There also are dentists who recommend that, in order to promote children's self-reliance in tooth-brushing, infants should each be given a tooth-brush to play with as a toy[11]. At the college hospital where the authors work, however, we recently experienced two cases of injury with tooth-brushes, both involving young children who fell on the floor with a tooth-brush in their mouths and hurt themselves. This type of accident was caused by letting young children, who have no readiness as yet for tooth-brushing, play with a tooth-brush as a toy.

Conclusion

As explained above, the authors conducted a study on preschool children's adaptability to recumbent-position brushing. As a result of analyses by AIC, it has been shown that although normal young children under the age of 2 years and 6 months often showed rejective behavior, they did become adaptive to recumbent-position brushing past that age. The authors feel that, for the pediatric dental healthcare of the future, it is important to give guidance in tooth-brushing to preschool children and their mothers and other guardians on the basis of a full understanding of such normal developmental stages and readiness as those outlined in this report.

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抄録：介助磨きに対する子どもの行動

小笠原　正，高井経之，塚田久美子，甲田寿美子，小柴慶一，穂坂一夫
渡辺達夫，笠原　浩（松本歯大・障害者歯科）

介助磨きに対して適応できる年齢を明らかにするために，健常な幼児（0歳から6歳）に対して母親による介助磨きを行わせ，その行動を観察した．

介助磨きに適応した者は79名（79%）で，拒否的行動がまったく認められなかった．しかしながら21名（21%）の者が不適応行動を示した．赤池情報量規準に基づき分析した結果，適応群と不適応群の判別年齢は，2歳6か月であった．2歳6か月以上の子どもは，介助磨きに適応できるレディネスが備わっていることが明らかとなった．