Premedication Intake Behavior – Does It Predict Behavior During Dental Treatment?

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Objectives: *to investigate whether behavior during hydroxyzine administration predicts children's behavior during dental treatment and whether behavior during treatment is affected by the complexity of treatment.* ***Materials and method:*** *118 children aged 2 to 6.5 years old were treated under conscious sedation with oral premedication (3.7 mg/kg of hydroxyzine in a concentration of 50mg/5 cc. hydroxyzine) and 50% nitrous oxide/oxygen sedation. Children were divided in two age groups: aged 2 to ≤ 4 years old, and aged 4 > to 6 years old.*

Behavior during first examination; cooperation during premedication administration, cooperation during nitrous oxide nose-mask placement, behavior during dental treatment, treatment duration and complexity of treatment were recorded. ***Results:*** *More children in the older group took the premedication willingly (p=0.026). Significant correlation (p=0.002) between behavior during examination and nitrous oxide mask acceptance was found in the older age group. No correlation was found regarding the cooperation during premedication intake and behavior during treatment within and between age groups. No statistical differences within the groups and between the groups were found between complexity of treatment and behavior during treatment.* ***Conclusions:*** *Premedication intake is not a reliable predictive tool for behavior during treatment in children aged 2-6.5 years. Complexity of treatment does not influence behavior during treatment in children aged 2-6.5 years.*

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INTRODUCTION

Children's behavior can be classified as cooperative, potentially cooperative, and lacking cooperative capability.[1] A child who misbehaves at the dental clinic, though he is considered to have the potential of behaving cooperatively, is considered a "behavior problem." Uncooperative paediatric dental patients constitute a heterogeneous group, with different fears, temperaments and behavior problem profiles.[2] Sedation has demonstrated effectiveness as an adjunct to behavior management for potentially cooperative children. It can help control anxiety, minimize psychological trauma, and reduce interfering and potentially harmful behavior and movements, thus ensuring safe completion of dental procedures.[3,4]

Inhalation sedation with nitrous oxide/oxygen can achieve relative analgesia. Its safe and easy administration makes it an effective alternative to general anaesthesia and intravenous sedation for children in the dental clinic.[5-7] Hydroxyzine is an oral premedication agent,[8] whose effectiveness has been shown to be enhanced by the addition of nitrous oxide.[8,9]

While maternal anxiety, maternal dental anxiety, child anxiety and child temperament have been investigated as predictors of child responsiveness to dental treatments,[10-13] reliable predictors of disruptive behaviors have yet to be identified. A pilot study found the capability of six-year old children to cope with dental treatment to be dependent on their psychological development and on their mothers' fear of dental treatment.[14] It seems that the mother's role is central, influencing on one hand the child's degree of psychological development, and on the other, the child's ability to cope with dental treatment.

Oral intake of a premedication is often difficult for children; dentists should make every effort to convince them to cooperate with taking the medication. Primosch and Bender[15] did not find any correlation between children's compliance in accepting oral administration of the premedication, midazolam, and Frankl behavioral ratings during

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dental treatment. We thought that the volume and taste of the premedication and the sedative effect in Primosch *et al*[15] study could have influenced their results. Thus, we set out to investigate whether behavior during hydroxyzine administration predicts children's behavior during dental treatment. In addition, we investigated whether behavior during treatment is affected by the complexity of treatment.

MATERIALS AND METHOD

The Hadassah Human Subjects Institutional Board approved this retrospective study.

Data was obtained from all children between the ages of 2 and 6 who were treated under conscious sedation with oral premedication (3.7 mg/kg of hydroxyzine in a concentration of 50mg/5 cc. hydroxyzine) and 50% nitrous oxide/oxygen at the post-graduate dental clinic of the Department of Paediatric Dentistry of the Hadassah School of Dental Medicine. Most patients are referred to the paediatric dental clinic by general practitioners who do not treat young uncooperative children.

Selection criteria were patients classified as American Society of Anesthesiology (ASA) Class I, with no prior experience with local anaesthesia, and whose preoperative behavior was assessed as uncooperative (rank 1 or 2) according to the Frankl Scale.[16] Children were divided in two age groups: aged 2 to ≤ 4 years old, and aged 4 > to 6 years old.

As is routine at our clinic, topical anaesthetic gel (benzocaine 20%), on a cotton-wool roll, was applied to the site prior to injection, and a rubber dam was used. For each patient, the operative procedures performed in the maxilla and mandible were similar. Treatment complexity was classified as simple (Fissure sealants, prophylaxis, Class I, Class II restorations) and complex (stainless steel crowns, pulp therapy, dental extractions).[17]

The following variables were accessed from the dental records: behavior during first examination, as assessed by the Frankl scale[16]; cooperation during premedication administration, assessed by the operator, and categorized as willing, coaxed, or forced to take medication[15]; cooperation during nitrous oxide nose-mask placement (accepted or refused); behavior during dental treatment according to the Houpt Scale[18] (Figure 1) and treatment duration.

Statistical Analysis

Frequencies and percentages were calculated for the categorical variables. The frequencies of the categorical variables between the 2 study groups, were compared by the "Chi square test" or by "Fisher-Irwin exact test (for small sample). The "Wilcoxon rank sum test" was used to compare between medians of results. Statistically level of significance for all tests was $p \leq 0.05$.

RESULTS

One hundred and eighteen children met the inclusion criteria of the study: 51 aged 2 to ≤ 4 years old and 67 aged 4 > to 6.5 years old.

Figure 1. Houpt Behavior Rating Scale [18]

Score	Description
1	Aborted: No treatment rendered
2	Poor: Treatment interrupted, only partial treatment was completed
3	Fair: Treatment interrupted but eventually completed
4	Good: difficult but all treatment was performed.
5	Very good: Some limited crying or movement
6	Excellent: No crying or movement

More children in the older group took the premedication willingly than did children in the younger group, 48% and 24% respectively, (p = 0.026). No significance was found between the two age groups in the numbers of children who were coaxed or forced to take the premedication. (Table 1)

No correlation was found regarding the cooperation during premedication intake and behavior during treatment within and between age groups. (Table 2)

Table 1. Cooperation during premedication intake

Cooperation during premedication intake	Younger group (2-≤4 years old) N (%	Older group (4>-6.5 years old) N (%)	p*
Willingly cooperated	12 (23.5)	32 (47.8)	***0.026**
Needed to be coaxed	24 (47.1)	22 (32.8)	NS
Were forced	15 (29.4)	13 (19.4)	NS

Table 2. The relationship between cooperation during premedication intake and behavior during dental treatment in 2 age groups.

		Cooperation in premedication intake		
		willingly/ coaxed	forced	P value*
	Behavior during treatment according to Houpt scale [18]	**N (%)**	**N (%)**	
Older group (4>-6.5 years old) (n= 67)	**1-3** **4-6**	8 (14.8) 46 (85.2)	4 (30.8) 9 (69.2)	0.228
Younger group (2-≤4 years old) (n= 51)	**1-3** **4-6**	7 (19.4) 29 (80.6)	4 (26.7) 11 (73.3)	0.711
	P value*	0.564	1.000	

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A significant correlation (p = 0.002) between behavior during examination and nitrous oxide mask acceptance was found in the older age group but not in the younger one. (Table 3)

No significant difference was found between the groups regarding nitrous oxide mask acceptance and behavior during treatment.

No statistically significant difference was found in complexity of treatment between the age groups. In addition, no statistical differences within the groups and between the groups were found between complexity of treatment and behavior during treatment. (Table 4)

Table 3. Correlation between behavior during examination and nitrous oxide mask acceptance in the 2 age groups

	Behavior at examination Frankl scale[16]	Acceptance of nitrous oxide mask N(%)	Refusal of nitrous oxide mask N (%)	P value*
Older group (4>-6.5 years) (N= 67)	'1-2' '3'	: 27 (73.0) : 10 (27.0)	'1-2': 30 (100.0) '3-4': 0 (0.0)	***0.002**
Young group (2-≤4 years) (51)	'1-2' '3-'	: 17 (81.0) : 4 (19.0)	'1-2': 29 (96.7) '3-4': 1 (3.3)	0.146
P value*		0.544	1.000	

Table 4. Complexity of treatment and behavior during treatment

Complexity of treatment	Behavior during treatment (Houpt scale)	simple N(%)	complex N(%)	P value*
Older group (4>-6.5 years) (N= 67)	1-3 4-6	11 (17.5) 52 (82.5)	1 (25.0) 3 (75.0)	0.555
Young group (2-≤4 years.) (51)	1-3 4-6	9 (19.2) 38 (80.8)	2 (50.0) 2 (50.0)	0.199
P value*		1.000	1.000	

DISCUSSION

The main finding of this study is that children's behavior during premedication intake does not predict behavior during dental treatment.

Our findings support those from the retrospective study conducted by Primosh *et al*.[15] Children in that study received 0.25-0.75 mg/kg midazolam mixed with ibuprofen or a hydroxyzine vehicle to make the solution more palatable, while the children in our study received 4.5 to 5cc of hydroxyzine. Nonetheless, the results were similar. Parameters which were not investigated such as: child temperament, mother anxiety, behavior modification during first examination, may have influenced the results.

We expected that children who were forced to take the premedication despite their refusal would behave better due to the behavior management techniques that were used. This was not demonstrated. The refusal or willingness to take the premedication did not predict behavior during dental treatment.

The lack of differences between the two age groups is surprising. We expected that older children, who are in the potentially cooperative age, would respond better to the assertiveness during premedication intake than younger children who are in the pre-cooperative age.

The current study investigated, in addition, acceptance of the nitrous oxide mask. While some children aged 4 to 6.5 years who complied with the nitrous oxide mask were cooperative during dental treatment, none of those who did not comply were cooperative. Such association was not statistically significant for the younger age group. We expected more cooperation among older children, consequent to increased understanding integral to the growth and development process.

We found a correlation between behavior at the initial examination and acceptance of the nasal mask of the nitrous oxide in the older group, meaning that children who behaved negatively at examination did not accept the mask. It seems that those children who refused to be examined also refused to begin the dental treatment, even though they were lightly sedated. This implies that behavior of sedated children during dental treatment may be predicted by child's temperament.[18]

Unsurprisingly, fewer children in the younger age group cooperated during premedication intake, and needed parental help to take the medication, compared to those in the older group. Previous studies have found chronological age to be the most important predictor of behavior during dental treatment.[17,20]

We did not find complexity of treatment to affect behavior during treatment. This may be because all treatments were performed in sessions of 20 to 30 minutes, which is considered a tolerable duration for children.[1] In a study that investigated simple treatments such as Type 1 composite restoration and prophylaxis followed by fluoride therapy, the duration of the dental session was not found to associate with behavior during the session.[17]

Limitations of the study included multiple operators who performed and recorded the sedation results, and who were not blinded to the preoperative behavior displayed. In addition, we did not examine temperament and maternal anxiety, which are well known to influence child's behavior. Another limitation of the study is the fact that this was retrospective unblended study.

More prospective studies are needed to determine the

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predictive value of various parameters such as temperament of the child, and the figure who administers the premedication to the child (parent, dentist),

CONCLUSIONS

Premedication intake is not a reliable predictive tool for behavior during treatment in children aged 2-6 years.

Complexity of treatment does not influence behavior during treatment in children aged 2-6 years.

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