

## The Effects Of Breakfast On Behavior Of Pediatric Patients In Dental Operatory

Research Article

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### Abstract

**Background:** The greatest challenge faced by a pediatric dentist while treating a child in the dental operatory is the uncooperative behaviour. The aim of the study was to evaluate the effect of breakfast on behavior of pediatric patients in dental operatory.

**Material and Methods:** A cross-sectional study was conducted among 80 children aged between 4-10 years undergoing non invasive treatment. The children were divided in to two groups: did not skip breakfast (control group) and skipped breakfast (study group). Children's behavior was assessed using Frankl's behavior rating scale during the course of treatment (pre-treatment, mid-treatment, and post-treatment). Descriptive statistics and independent t tests were performed for analysis.

**Results:** A statistically significant difference was noted in the behavior score between the two groups of children during the course of treatment ( $P < 0.05$ ). The overall mean score of children in group I was  $3.26 \pm 0.2$  and in group II was  $2.1 \pm 0.5$ . The reasons for skipping breakfast were insufficient time (52.5%), not being hungry (30%), or believing in the myth to have an empty stomach prior to dental appointment (17.5%).

**Conclusion:** A possible relation exists between breakfast consumption and behavior changes in young children.

**Keywords:** Behavior; Breakfast; Dental Operatory; Frankl's Behavior Rating Scale; Pediatric Dentist.

### Introduction

Breakfast is the first meal of the day consisting of food or beverage from at least one food group which breaks the fast after the longest period of sleep and is consumed within 2 to 3 hours of waking [1]. Breakfast is widely conceded as the most important meal of the day as it brings about metabolic changes involved in regulating blood glucose, insulin levels, lipid metabolism, appetite and energy balance [2].

Children have an increased brain glucose metabolism compared with adults. Positron Emission Tomography researchers indicate that cerebral metabolic rate of glucose utilization is relatively twice as high in children aged 4-10 years when compared with

adults [3]. As the brain of a child is relatively larger and more active than the adult's, children may be particularly more responsive to provision of glucose which is considered as the major fuel of the brain [4]. Additionally, the longer overnight fasting period, due to higher sleep demands during childhood and adolescence, can deplete glycogen stores overnight [5]. In order to maintain this higher metabolic rate, a continuous supply of energy derived from glucose is required. Therefore, breakfast consumption may be paramount in providing adequate energy for day [6].

Sandercock et al., stated that children who do not devour breakfast are more likely to be less physically active and have a lower cardio-respiratory fitness level [7]. Moreover, there is evidence that breakfast consumption positively influences learning in chil-

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dren in terms of behavior, cognitive, and school performance [8]. The benefits of eating a breakfast meal have been reported extensively, with recent findings showing an immediate effect on cognitive performance, feeling of well-being, added to benefits related to nutrient intakes and diet quality [8, 9].

Although the evidence is quite mixed, studies demonstrate that eating breakfast has a positive effect on children in terms of memory, mood and attention [10, 11]. Adolphus et al., reported that the ignorance of morning meals will end up with the symptoms such as extreme hunger, irritation, anger, aggression and fatigue, due to exhaustion of glucose levels in the morning [12]. Consuming breakfast can have a positive effect on cortisol - the primary "stress hormone". The levels of cortisol are reported to be highest early in the morning, which necessitates the consumption of breakfast to bring down the hormone levels. If cortisol levels are too high, the children most likely feel anxious [13].

Pediatric dentists often have to face a battle before treating their patient, due to disruptive behavior [14]. Lack of cooperation in children not only affects the completion and quality of necessary dental treatment, but also aggravates the degree of stress in the dentist. Out of various reasons for externalizing behavior in children, skipping breakfast may be one. Though, this factor is not under the control of a practitioner, the knowledge about its influence on children's behavior can be of considerable aspect in clinical practice.

Various studies have evaluated the effects of breakfast on cognitive and academic performance in school children. To the best of our knowledge, none of the studies have assessed the influence of breakfast in behavior of patients in dental operatory. Our department is passionate about child care, and we have published numerous high quality articles in this domain over the past three years [15-26]. With this inspiration we planned to pursue research on the effects of breakfast on behavior of pediatric patients in dental operatory.

## Material and Methods

The cross-sectional study was conducted in the Department of Pediatric and Preventive Dentistry from October 2019 to February 2020. Ethical approval for the study was obtained from the Institutional Scientific Review Board prior to the start of the study (IHEC/SDC-PEDO1803/19/036). The participation in the study was voluntary and informed consent was obtained from the parents or the care-takers of the children.

A pilot study was conducted among 20 children and the sample size for this study was determined by using G-Power analysis with a power of 80% and confidence interval 95% that arrived at a total sample of 80.

The inclusion criteria were healthy children between the ages of 4-10 years who require non invasive treatment for primary or permanent teeth. Children with a history of any systemic disorder, on constant medication, undergoing invasive dental treatment, whose consent was not obtained from parents/guardians, or whose behavior modification has already been done, were excluded from the study.

Parents of these children were questioned regarding the consumption of breakfast: time, portion size and if skipped, the reason for skipping breakfast- were recorded. The children who were reported to have consumed any energy containing food or beverage from at least one food group within 2-3 hours of waking were included as the control group (Group-I; Children who did not skip breakfast) and those who completely skipped the morning meal were included as the study group (Group-II; Children who skipped breakfast). The study was conducted early in the morning. All children were exposed to tell-show-do behavior management techniques.

In the dental operatory, the child's behavior was rated according to Frankl's behavior rating scale into definitely negative, negative, positive and definitely positive (Score 1-4) (Figure 1). The behavior of the children were recorded: (i) Before start of treatment (Pre-treatment) at the consulting room, (ii) When treatment was rendered (Mid-treatment) and (iii) Post-treatment before relieving the patient from the department. The behavior of children was assessed by a trained pediatric dentist other than the operator throughout the study.

## Statistical Analysis

The extracted data were tabulated in a spreadsheet (Excel 2017: Microsoft Office) and analyzed using SPSS software 17.0 version (SPSS Inc., Chicago, IL, USA). Descriptive statistics and Independent t tests were done for analysing the data and a P value of < 0.05 was said to be statistically significant.

## Results

Of 80 children (Group I- 40; Group II- 40) participated in the study, 55% (44 children) were males and 45% (36 children) were females. The mean age of children in group I was  $6.47 \pm 1.53$  years and in group II was  $6.14 \pm 1.28$  years. The distribution of participants is shown in Table 1.

In terms of behavior assessment, a statistically significant difference was noted between the two groups of children during the course of treatment ( $P < 0.05$ ) (Table 2). The overall mean score of children in group I was  $3.26 \pm 0.2$  and in group II was  $2.1 \pm 0.5$ . The behavior of children participated in the study during the course of treatment is depicted in Figure 2.

Based on gender comparison, there was no statistically significant difference in both the groups during all phases of treatment ( $P > 0.05$ ) (Table 3).

The reasons stated for skipping breakfast were either insufficient time (52.5%), not being hungry (30%), or believing in the myth to have an empty stomach prior to dental appointment (17.5%).

## Discussion

In the pediatric dental service provision point of view, the long-term accomplishment of any treatment provided by a pediatric dentist profoundly relies upon the cooperation level of a child during the dental visit. Therefore, as much as it is essential for dentists to realize how to manage the children's behaviour in the dental operatory, it is imperative to know the factors that impact

Table 1. Summary of demographic variables describing sample size, age (mean ± standard deviation) and number of male and female participants in each group.

Treatment Groups	Sample Size	Age (Years)	Gender (Female/Male)
Did not skip breakfast (Control group)	40	6.47 ± 1.53	20/20
Skipped breakfast (Study group)	40	6.14 ± 1.28	16/24

Table 2. Behavior rating scores (Mean ± Standard deviation) during the course of treatment in the treatment groups.

	Did not skip breakfast (Control group)	Skipped breakfast (Study group)	P value
Pre-treatment	3.5 ± 0.6	2.7 ± 0.9	<0.001*
Mid-treatment	3.1 ± 0.7	1.7 ± 0.7	
Post-treatment	3.2 ± 0.6	1.8 ± 0.8	
Overall Mean Score	3.2 ± 0.6	2.1 ± 0.5	

\*P<0.05, Statistically significant

Table 3. Behavior rating scores (Mean ± Standard deviation) and statistical comparison based on gender in the treatment groups.

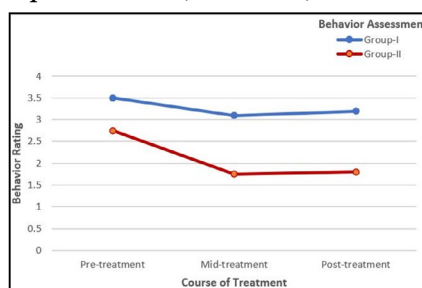
Gender	Control Group			Study Group		
	Pre-treatment	Mid-treatment	Post-treatment	Pre-treatment	Mid-treatment	Post-treatment
Female	3.5 ± 0.6	3.1 ± 0.7	3.1 ± 0.8	2.5 ± 1.1	1.3 ± 0.5	1.5 ± 0.7
Male	3.4 ± 0.6	3.1 ± 0.8	3.3 ± 0.4	2.8 ± 0.7	2.0 ± 0.8	1.9 ± 0.9
P value	0.70	0.70	0.36	0.17	0.08	0.07

P>0.05; Not significant

Figure 1. Frankl behavior rating scale used in the study for assessing the behavior of study participants.

FRANKL BEHAVIOR RATING SCALE		
RATING	ATTITUDE	DEFINITION
1	Attitude negative	Refusal of treatment, crying forcefully, fearful or any other overt evidence of extreme negativism.
2	Negative	Reluctant to accept treatment, uncooperative, some evidence of negative attitude but not pronounced, i.e./ sullen, withdrawn.
3	Positive	Acceptance of treatment; at times cautious, willingness to comply with the dentist, at times with reservation but patient follows the dentist's directions cooperatively.
4	Definitely positive	Good rapport with the dentist, interested in the dental procedures, laughing, and enjoying the situation.

Figure 2. The image represents the behavior of children participated in the study during the course of treatment, where Y-axis denotes the behavior rating score and X-axis denotes the course of treatment. Blue color denotes Group I (Control group) and Red color denotes Group II (Study group). Drastic behavior change towards negative behavior can be noted in the study group when compared to the control group and the differences are statistically significant in all the phases of treatment (Independent t test; P=<0.001, Statistically significant).



the behaviours [27]. Additionally, understanding the reason for children's behaviour assists the dentist to plan appointments and render effective and efficient dental treatment [28].

The uncooperative behavior in children could be attributed to a variety of reasons, among which skipping breakfast could be one.

Kleinman et al, stated that children who encounter hunger are seven times more likely to immerse in physical altercations [29]. Additionally, several studies reported that hunger can lead to attention problems, behavior and emotional problems [4, 8, 10]. Hence, it is crucial to understand their role in the child's behavior. Till date, there is no published study in the literature that has assessed the relationship of breakfast with the child's behavior in the dental operator. With this understanding, the present study was taken up to evaluate the effect of breakfast on the behavior of children in the dental operator.

The current study utilized Frankl behavior rating scale for behavior assessment, which is one of the proven reliable tools developed for behavior rating of children in dental sittings [30].

Mishra et al., stated that the type of treatment rendered affects the behavior significantly as the children who under went non invasive procedures such as restorations, oral prophylaxis showed positive behavior and those who underwent invasive procedures like extraction and root canal treatment exhibited negative behavior [28]. The current study included children who required non-invasive dental treatment only to rule out the pain, needle phobia and other related factors that increases the children's apprehension which on its own promotes negativity and may contribute to negative behavior.

On an average, the children in the control group showed positive behaviour during the different phases of treatment. Where as in the study group, the proportion of children who displayed positive behaviour during the pre-treatment phase, decreased during the course of treatment. While those who showed negative behavior continued the same through out the course of treatment. It was also observed that the children in the study group exhibited more negative behaviour towards the end of the treatment. These findings are in agreement with those of Adolphus et al., that the ignorance of breakfast results in irritation, anger and aggression, thereby modifying the behaviour of children [12]. Moreover, Jamali et al., stated that the extended dental treatment length is associated with higher levels of behavioral problems in children [31]. The present study also divided children according to gender to identify if there is any significant difference of behavior between male and female and found no significant differences in both groups ( $P > 0.05$ ).

Various researchers have reported that a more positive behaviour can be expected from children as age increases, since older children are more likely to be emotionally mature to understand things and tend to cope with the circumstances [32, 33]. Conversely, in the study group, children despite age, exhibited negative and definitely negative behavior during the course of treatment. Skipping breakfast can make children feel tired, restless, or irritable. Breakfast is the way to refuel the body for the day ahead after going without food for 8 to 10 hours during sleep. The children's mood, energy, and the ability to pay attention can drop by mid-morning if they don't consume at least a small morning meal [5, 10]. The attention span of children is of paramount importance in successfully completing the dental treatment; deficiency of which can lead to the use of advanced behavior guidance techniques such as sedation [34].

The explanations stated for skipping breakfast were insufficient time (52.5%), not being hungry (30%), or believing in the myth

to have an empty stomach prior to dental appointment (17.5%). These are in accordance with the study conducted by Fugas et al., which stated the lack of time, not being hungry in the morning and feeling unwell at the time of having breakfast as explanations for skipping breakfast before going to school [35]. These findings underline the need for stressing the importance of morning meals to parents and children.

The reason for uncooperative behavior of the children in the study group cannot be limited to only skipping breakfast. The behavior of the child on dental visits can be influenced by variables such as age, parental behavior, parental anxiety, past medical and dental history, type of dental settings, treatment duration, behavior management and procedural techniques followed by the dentist [36].

The major limitations of this study were the limited sample size, short study duration and also related to the fact that this was not a random sample of patients scored by independent observers, rather the patients reporting for their dental operator visit who were treated by a single dentist and also scored by another single pediatric dentist. Intra-examiner reliability examinations were not performed due to the nature of the variable (observed child's behavior) that could not allow repeated examination. This may have brought in some observer bias although every effort was made to be consistent with the patient's ratings. It ought to anyway be noted that behavior modification utilized by the dentist could have influenced the behavior outcome, which was unavoidable.

A suggested recommendation for further research is to conduct more in-depth research on the behavior aspect in multiple visits in a larger population size.

## Conclusion

This study demonstrates a possible relation between breakfast consumption and behavior changes in young children. Within the scope of the study and the variables, it can be recommended to consume breakfast before dental appointments unless otherwise specified, in order to eliminate many behavior-related problems during the course of treatment.

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