

# Impact of Child Birth Order on Dental Caries and Anxiety Level

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**ABSTRACT:** Background: Many factors influence dental caries as well as dental anxiety of paediatric children, one of them is child-birth order. Child's growth and development greatly influenced by the surrounding environment which may has positive or negative impact on his physical, mental and even emotional health. This study was conducting to evaluate whether child birth-order has an influence on dental caries and dental anxiety of children attending pediatric dental clinic. Materials and methods: this study conducted at pediatric dental clinic/ Ibn Sina University of Medical and Pharmaceutical Sciences, (112) pediatric patients included in this study and grouped according to their birth order as eldest group (N=37), middle group (N=35) and youngest group (N=40). For each group both dental caries using (DMFS/dmfs index) and dental anxiety using (faces version of the modified child dental anxiety scale MCDAS (f)) were measured. One-way ANOVA test used for statistical analysis. Results: Data showed significant impact for birth order on dental caries with (p= 0.035), while the study found non-significant difference between child-birth order and dental anxiety with (p= 0.899). Conclusion: child birth-order significantly influence dental caries with eldest children less affected by dental caries compared to youngest children, with non-significant impact on dental anxiety.

**Keywords:** Birth order, DMFS/dmfs, Modified Child Dental Anxiety Scale MCDAS, Child rank



## 1. INTRODUCTION

Children are part of their family and the way of their engagement with the surrounding could influence their dental behaviour [1]. Dental anxiety is unpleasant feeling associated with dental treatments due to negative expectation (e.g something dreadful was going to happen) [2]. In the children, dental anxiety prevalence is higher (5 to 61%) than that of the adult which is about (1 to 52%) [3].

Dental anxiety should not be confused with dental fear (dental fear is state of abnormal emotional reaction to specific stimulus) [4]. Fight- or flight response which is associated with anxiety or fear emotions lead to the release of adrenaline, cortisol and lactic acid, which accelerate heart rate, breathing rate and vasoconstrictors of the peripheral vessels leading to blood pooling and muscle tension. Dental anxiety is associated with sweating, silence or minimal interaction, increasing heartbeat, irritability, crying, panic, distress, humor or even fainting [5]. Clinically, it is challenging or difficult for the dentist to differentiate between fear and dental anxiety because children are probably exhibit combined responses of fear and anxiety due to overlapping neural circuits of both fear and anxiety [6]. Therefore, unfavorable feelings associated with the dental environment is termed 'dental fear and anxiety' (DFA) [7]. Oral health and life style of the child could be directly and / or indirectly affected by dental anxiety and fear. In a study achieved by Yon et al. exhibited that dental anxiety could lead to health modifications (e.g. poor oral health acceptance and sleep disturbance), behavioral changes (e.g. avoidance of dental environment, aggression, crying), physiological disruption (e.g. sweating, dry mouth, racing heart beat) also personal and familial relationships can be adversely influenced [8]. Dental caries is a multifactorial disease with three main etiological factors (host, diet and microorganisms in the presence of time), in addition, there are many risk factors that increase the incidence of its initiation and progression and such health modifications could be considered as one of them [9].

This study aims to evaluate the influence of child rank or child birth-order (first, middle and last child) on dental caries and dental anxiety level. The hypothesis of this study propose that child birth-order has an impact on dental

caries and dental anxiety level. The null hypothesis (H0) would be tested against an alternative hypothesis (HA) that differences would be found.

## 2. MATERIALS AND METHODS

Ethical approval (number 13.1.24) was obtained from Ethical Committee at (Ibn Sina University of Medical and Pharmaceutical Sciences) for this cross-sectional study which was conducted at pediatric dental clinic/College of Dentistry/Ibn Sina University of Medical and Pharmaceutical Sciences, in a period from September to October 2024.

The examiner conducted a pilot study for 10 child and used G\*Power version (3.1.9.4) to detect the sample size with (0.05  $\alpha$  error probability), (0.095 statistical power), 111 subjects are required to detect (0.38) effect size.

Child birth order was obtained by asking the parents/ caregiver or the person who accompany the patient to the clinic about the child rank/birth order in the family. Accordingly, the children classified as eldest or (first) child who given number (1), middle child given number (2) and the youngest (last born) child number (3). The number of participants that referred to pediatric dental clinic within the required age (8 to 12 years) was (112). The participants were from both genders (60 females and 52 males). The number of children in each group was; group1 (eldest=37), group2 (middle=35) and group3 (youngest=40).

Dental caries measured using DMFS/dmfs index according to WHO criteria where (d)= primary teeth decayed, (D)= secondary teeth decayed, (m)= primary teeth missing, (M)= secondary teeth missing, (f)= primary teeth filled, (F)= secondary teeth filled and (S/s) =surface [10]. While, dental anxiety of the children was examined and measured by using valid and reliable of Modified Child Dental Anxiety Scale MCDAS (faces version (F)) [11]. This scale includes eight questions, starting from going to the dentist and ending with tooth extraction and general anesthesia. This study used just a three-faces of the scale to simplify the examination procedure for the children, with scoring represent (1= not anxious; 3= fairly anxious; and 5= very anxious) figure (1). Then the numbers were collected and the final total score represents the child's degree of dental anxiety [12].

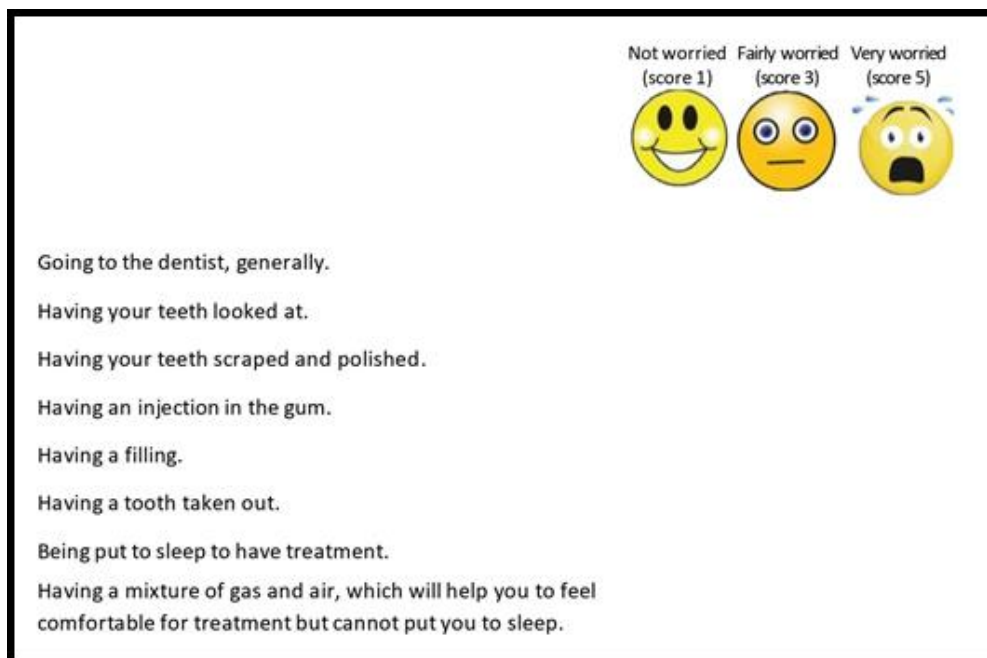


FIGURE 1. - MCDAS (faces) [12]

### 2.1 STATISTICAL ANALYSIS

SPSS (version 21.0) was used for data analysis. For each group (mean, standard deviations, standard error, minimum and maximum values) were calculated as descriptive statistics. To find out the impact of child birth order on dental caries and dental anxiety one-way ANOVA test was applied. And LSD (least significant difference) test was carried out to measure the difference among the groups. ( $P \leq 0.05$ ) regarded statistically significant.

## 3. RESULTS

The results revealed differences in the dental caries of the three groups, with highest mean value in the last-bom children (14.97), lowest value in the first bom one (9.67) and the middle-born children have the value of (11.28). (Table 1) represent the descriptive statistics for DMFS/ dmfs scores in the eldest, middle and youngest group.

**Table 1. - Descriptive statistics for DMFS/ dmfs scores**

Groups	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
1.00	37	9.675	7.498	1.232	1.0	28.0
2.00	35	11.285	8.723	1.474	.00	35.0
3.00	40	14.975	10.646	1.683	3.0	38.0
Total	112	12.071	9.301	.878	.00	38.0

Significant difference in dental caries among groups was found between eldest and youngest group, with non-significant difference between eldest and middle group, youngest and middle group shown in (Table 2).

**Table 2. - Multiple Comparisons in DMFS/dmfs among groups**

Among groups	Mean Difference	Std. Error	Sig.
1.00 2.00	-1.6100	2.146	.455
1.00 3.00	-5.299*	2.076	.012
2.00 1.00	1.610	2.146	.455
2.00 3.00	-3.689	2.106	.083
3.00 1.00	5.299*	2.076	.012
3.00 2.00	3.689	2.106	.083

Regarding the impact of child birth-order on dental caries, one way ANOVA test was used and the results reveal significant effect of child rank on dental decay with (p=0.035) as shown in (Table 3).

**Table 3. - The impact of child birth order on DMFS/dmfs**

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	571.203	2	285.601	3.447	.035
Within Groups	9032.226	109	82.864		
Total	9603.429	111			

For dental anxiety level, this study showed relatively close mean value (16.02), (16.28) and (16.7) for eldest, middle and youngest group respectively as described in (Table 4).

**Table 4. - Descriptive statistics for dental anxiety scores**

Groups	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
1.00	37	16.027	7.617	1.252	8.0	34.0
2.00	35	16.285	6.271	1.060	8.0	28.0
3.00	40	16.70	5.355	.846	7.0	28.0
Total	112	16.348	6.404	.605	7.0	34.0

Concerning the influence of child birth-order on dental anxiety level this study showed non-significant impact with (p= 0.899) presented in (Table 5).

**Table 5. - The impact of child birth order on dental anxiety level**

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	8.904	2	4.452		
Within Groups	4544.516	109	41.693	.107	.899
Total	4553.420	111			

## 4. DISCUSSION

The present study revealed that child birth order has a significant impact on dental caries and non-significant on dental anxiety level. Regarding the impact of child rank on dental caries, this study found significant relation with  $P=0.035$ , this come in accordance with a study suggested that the eldest siblings report receiving much more psychological support and care from their parents than the youngest siblings so had less dental caries [13]. Also, the study found significant differences in dental caries ( $p=0.012$ ) between eldest and youngest group, this result agreed with a study showed that the risk of developing new carious lesions in the teeth of later-bom children was higher when compared to first-bom babies [14]. In the same context, a study achieved by Chung et al., showed that caries prevalence risk in (12–18) years old children was directly proportional to the ordinal position of the children in the family [15]. It had been found that eldest siblings in addition to receiving higher psychological care and support from parents compared to the youngest children [16], they were exposed to extra principles, high monitoring and further supervision by their parents than later-born siblings [17,18]. Strategic behavior of the parents [187] and sibling influences, both were suggested as possible mechanisms behind the birth order effects on dental caries [19]. Other hypothesis regarding elevated dental caries in later-bom children was that during the period of infancy they exposed to highly amount of sugar containing foods and drinks earlier than first-born children, this dietary pattern greatly connected with high childhood caries incidence in the next years [20]. Another reasonable explanation for dental caries variation between eldest and youngest siblings is, on average, youngest babies are more likely to suffering from unpleasant situations like parent's loss or divorce (which regarded as a type of family disruptions) at smaller ages compared to early-bom siblings [21].

The result shown non-significant impact of child birth-order and dental anxiety with ( $p= 0.899$ ) among the three groups, this result is in agreement with a study done on 53 children in New Jersey to see if there is an interaction between anxiety levels and birth order and no significant results were found among them [22]. Also, the result is in accordance with a study achieved by Aminabadi et al. which found that the role of child rank had been abandoned as a probable factor influencing the behavior of the child during routine dental care [23]. Whereas, finding of this study regarding birth order and dental anxiety disagrees with a study done by Wu and Gao (2018), which found that dental anxiety develop during early childhood result from various factors which have significant impact on child's emotions and personality one of them is presence of siblings in the family and child birth order due to direct and/or various indirect learning that the child receive early in life. Also, the family which considered as environmental factor may have valuable impact on the development as well as (maintenance) of dental anxiety. Family factors, such as place of child's birth, the number of brothers and sisters in a family, educational level and age of the parents affect on the dental anxiety level of children aged (6–14) years, this means that parents and siblings have grate impact on the development of children's personality, their relation with the surrounding and the way they deal-with potentially fearful or stressful situations like dental procedures [24].

Subconscious and suppressed parents' fears and memories, may have significant impact on that of their children, therefore, realization of such problems can in future lowering the risk of dental-anxiety emergence and elevate the capability of their children to benefit from dental care for their rest of life [25].

## 5. CONCLUSION

Child birth order had a significant influence on dental caries as found in this study, with first bom children being minimally affected in contrast to the last bom children that showed increased DMFS/dmfs score. While dental anxiety level not affected by child birth order.

An author recommends to use other dental anxiety measurement tools such as biological or cognitive assessment one, in addition to measuring other variable that could affected by child birth-order like gingival and periodontal health status.

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## CONFLICTS OF INTEREST

The authors declare no conflict of interest

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