

ORIGINAL ARTICLE

Correlation of Child Temperament with Severity of Early Childhood Caries in Children Aged 3-6 Years

ATIQU UR RAHMAN¹, MUHAMMAD JUNAID HASHMI², SADIA RASHID³, SOBIA SIDDIQUE⁴, QAISER ALI⁵, AIMEN MALIK⁶

¹Assistant Professor Department of Maxillofacial Surgery Mufti Mehmood Teaching Hospital, Dera Ismail Khan

²Lecturer Department Community Dentistry Bakhtawar Amin Medical and Dental College, Multan

³Professor of Physiology Frontier Medical & Dental College, Abbottabad

⁴Assistant Professor Department of Oral Pathology, HBS Medical & Dental College, Islamabad

⁵Demonstrator Department of Orthodontics, HBS Medical & Dental College, Islamabad

⁶Clinical Demonstrator, Oral Medicine & Diagnosis Department, Institute of Dentistry, CMH Lahore Medical College, NUMS

Correspondence to: Dr. Muhammad Junaid Hashmi, Email: drjunaidhashmi57@gmail.com

ABSTRACT

Objective: To check the correlation of child temperament with severity of early childhood caries in children aged 3-6 years.

Design of the Study: It's a cross-sectional study.

Study Settings: The study was conducted at Department of Dentistry and Oral Pathology, Bakhtawar Amin Medical and Dental College, Multan from August 2020 to August 2021.

Material and Methods: Total 700 children aged between 3-6 years who fulfill the inclusion criteria were selected along with their parents/ primary caregivers. In the present study temperament was assessed using Thomas and Chess's parent temperament questionnaire. Both intensity and frequency of occurrence of that particular behavior was considered, each entity is scored on a five (5) point scale. Rating is done on negative and positive directions in which scores of 1-5 represent the extremes of intensity and frequency of occurrence of that behavior. At the midpoint, score of 3 is average according to the parent's insights.

Results of the Study: Among the study group of, 24% belonged to the age group 3 years, 29% belonged to age group 4 years, 27% belonged to the age group 5 years and 20% belonged to the age group 6 years. Forty nine percent among the study group were male participants whereas 51% were female participants. Fifty percent of the participants among the study population had caries while 46% of the study participants were free of caries. The results showed that children with caries had lower overall temperament scores (36.49 ± 5.67) compared to subjects without caries (38.82 ± 5.43). There was a statistically significant correlation with $p < 0.001$.

Conclusion: There was a significant correlation between child temperament scores of Sociability, Energy and Emotionality and Caries Severity Index scores. No correlation could be established with Attentivity and Rhythmicity scores. It can be concluded that in early childhood caries child temperament is a risk factor.

Keywords: Temperament, Early Childhood Caries

INTRODUCTION

Early Childhood Caries (ECC) is a widespread prolonged disorder, found in children under the age of six, which is characterized by the presence of missing (due to caries), filled tooth surfaces in any primary tooth (dmft) or one or more decayed (non-cavitated or cavitated lesions), that affects low- and middle-income countries and communities rapidly and extremely.^{1,2} If the children under the age of three show any symptom of smooth-surface caries, besides the children from age three to five who have a dmf score of ≥ 4 (age 3), ≥ 5 (age 4), or ≥ 6 (age 5) surfaces are categorized as Severe Early Childhood Caries (S-ECC). Despite the advancement in etiology knowledge and treatment approaches, the Early Childhood Caries clinical therapy frequently necessitates the surgical mediations, Early Childhood Caries occurs repeatedly in treated cases, roughly forty percent in a year.³ As a result, management has shifted away from just operational treatment and towards more attention on caries monitoring and prevention as a disease.⁴

Early Childhood Caries has been related with other health problems including infections, leading to difficulty in chewing, local pain, abscesses, difficulty in sleeping and malnutrition.⁵ Moreover, the pain linked with dental caries has a damaging influence on children's sleep patterns, ability to learn or perform their usual activities, and

emotional status.⁶ If the ECC in preschool children is left untreated, they may suffer dental pain which lead to avoid specific foods that may dreadfully affect their nutrition level.^{7,8} Temperament begins at birth and has a long lasting impact on child's development. Individual variances in children's responses to various settings and conditions are measured to determine their temperament.^{9,10}

Hardly a few researches have looked into the link between a child's dental caries and temperament. In North America two researches were performed. Quinonez and colleagues looked at the links between Early Childhood Caries, parental nutritional habits and 'hot-tempered' children.¹¹

They discovered that being a native Canadian, being introverted and having longer feeding patterns all predict about Early Childhood Caries. Nevertheless, there was no link found between the duration of feeding and temperament. In Iowa City, a research discovered a connection between mothers' insights about their children's temperament and frequency of non-cavitated caries in their bivariate analysis.¹²

Early childhood caries may be related to temperament, directly and indirectly through nutritional and oral hygiene habits. The role of psychosocial variables including child temperament is less explored in the Pakistani Population.

MATERIAL AND METHODS

This cross-sectional study was conducted at Department of Dentistry and Oral Pathology, Bakhtawar Amin Medical and Dental College, Multan from August 2020 to August 2021. Ethical committee approval was obtained from the Institutional Ethics Committee. Sample size of 700 children was calculated using WHO calculator taking expected prevalence of ECC to be 31% as per the previous literature). Children aged between 3-6 years having early childhood caries were included in the study. Children with any systemic disease or uncooperative children were excluded from the study. The current research states that temperament was measured based on these 5 variables factor 1 (sociability), factor 2 (emotionality): factor 3 (energy): factor 4 (attentivity): and factor 5 (rhythmicity). In the present study temperament was assessed using Thomas and Chess's parent temperament questionnaire. Consider both intensity and frequency of occurrence of that particular behavior, each entity is scored on a five (5) point scale. Rating is done on negative and positive directions in which scores of 1-5 represent the extremes of intensity and frequency of occurrence of that behavior. At the midpoint, score of 3 is average according to the parent's insights. Parents were given a kid temperament questionnaire to fill out in order to gather the necessary and relevant information on their children's temperament. The children were given questionnaire with the consent form to take home with them. The parents were asked to fill up the questionnaires and return them the next day. The statistical analysis was done using SPSS V-22. Pearson correlation test was used to assess the correlation between Caries Sevrity Index and child temperament.

STUDY RESULTS

Among the study group of, 24% belonged to the age group 3 years, 29% belonged to age group 4 years, 27% belonged to the age group 5 years and 20% belonged to the age group 6 years. Forty nine percent among the study group were male participants whereas 51% were female participants. Fifty percent of the participants among the study population had caries while 46% of the study participants were free of caries.

Sociability: Independent student t test was used to compare the mean sociability scores between the study groups, which included the individual parameters of approach, adaptability and sensitivity threshold. The test revealed that caries group had lower mean sociability scores (10.41±2.84) compared to caries- free group (11.3±2.67). All three sociability components, approach, adaptability, and response threshold, showed statistically significant differences (p ≤ 0.005).

Test of independent student was used to differentiate the mean emotionality scores between the study groups. The caries children had an emotionality score of 7.45±1.87 compared to 8.16± 1.61 in non-cariou children. The mean score difference was statistically significant (p value<0.001). Both mood and persistence components had statistically significant correlation with ECC (p value = <0.001).

Energy Score: Independent student t test was used to compare the mean energy scores between the study groups. Children with ECC have low energy scores

(8.11±1.64) than in non-cariou children (8.56±1.39 which showed significant statistical correlation (p value<0.001). Activity component has statistically significant correlation with ECC (<0.001) but intensity component had no significant correlation.

Attentivity: Independent student t test was used to compare the mean attentivity scores between the study groups. There was no significant statistical correlation between the groups and overall attentivity levels (p= 0.36).

Rhythmicity: Independent student t test was used to compare the mean rhythmicity scores between the study groups. This difference with respect to the mean rhythmicity scores were not statistically significant at p=0.06 on comparing scores in children with and without caries.

Table no: 1 Demographics of the study participants

Variables	Category	n	%
Age	3 y	168	24.0%
	4 y	206	29.4%
	5 y	189	27.0%
	6 y	137	19.6%
Gender	Males	346	49.4%
	Females	354	50.6%
Variables	Category	n	%
Caries	With	376	53.7%
	Without	324	46.3%

Table no: 2 Comparison of mean Scores for Sociability domain items between subjects with and without caries

Variables	Caries	N	Mean	SD	Mean Diff	t	P-Value
Approach	With caries	376	3.31	1.33	-0.26	-2.713	0.007*
	Without caries	324	3.57	1.28			
Adaptability	With caries	375	3.69	1.22	-0.27	-2.922	0.004*
	Without caries	324	3.96	1.16			
Sensitivity Threshold	With caries	376	3.42	1.33	-0.35	-3.572	<0.001*
	Without caries	324	3.77	1.21			
Total Scores - Sociability	With caries	376	10.41	2.84	-0.89	-4.241	<0.001*
	Without caries	324	11.3	2.67			

Table 3: Comparison of mean Scores for Emotionality domain items between subjects with and without caries using Independent Student t Test

Variables	Caries	N	Mean	SD	Mean Diff	t	P-Value
Mood	With caries	376	3.96	1.13	-0.28	-3.555	<0.001*
	Without caries	324	4.24	0.96			
Persistence	With caries	376	3.49	1.22	-0.43	-4.936	<0.001*
	Without caries	324	3.92	1.06			
Total Scores - Emotionality	With caries	376	7.45	1.87	-0.71	-5.355	<0.001*
	Without caries	324	8.16	1.61			

Table no: 4 Comparison of mean Scores for Energy domain items between subjects with and without caries

Variables	Caries	N	Mean	SD	Mean Diff	t	P-Value
Activity	With caries	376	4.00	1.03	-0.37	-4.967	<0.001*
	Without caries	324	4.37	0.92			
Intensity	With caries	376	4.11	1.06	-0.08	-1.034	0.30
	Without caries	324	4.19	1.05			
Total Scores - EnergyScores	With caries	376	8.11	1.64	-0.45	-3.913	<0.001*
	Without caries	324	8.56	1.39			

Independent student t test was used to compare the mean temperament scores between the subjects with and without caries. The results showed that children with caries had lower overall temperament scores (36.49± 5.67)

compared to subjects without caries (38.82± 5.43). There was a statistically significant correlation with $p < 0.001$.

To assess the relationship between Caries Severity Index and Temperament Scores among study subjects with Caries, Pearson Correlation Test was used. The results revealed that three parameters of temperament, namely Sociability, Emotionality and Energy scores had significant negative correlation with CSI whereas Attentivity and Rhythmicity did not show any significant correlation.

Table no: 5 Comparison of mean Scores for Attentivity domain items between subjects with and without caries

Variables	Caries	N	Mean	SD	Mean Diff	t	P-Value
Distractibility	With caries	376	3.55	1.22	0.18	1.861	0.06
	Without caries	324	3.37	1.33			
Attention Span	With caries	376	3.30	1.17	-0.30	-3.449	0.001*
	Without caries	324	3.60	1.11			
Total Scores - Attentivity Scores	With caries	376	6.86	1.67	-0.12	-0.910	0.36
	Without caries	324	6.98	1.79			

Table no: 6 Comparison of mean Scores for Rhythmicity domain items between subjects with and without caries

Variables	Caries	N	Mean	SD	Mean Diff	t	P-Value
Rhythmicity	With caries	376	3.65	1.24	-0.17	-1.873	0.06
	Without caries	324	3.82	1.08			

Table no: 7 Comparison of mean Total Temperament scores between subjects with and without caries

Variables	Caries	N	Mean	SD	Mean Diff	t	P-Value
Total Temperament	With caries	376	36.49	5.67	-2.33	-5.530	<0.001*
	Without caries	324	38.82	5.43			

Table no: 8 Pearson Correlation Test to assess the relationship b/w CSI and Temperament Scores among study subjects with Caries

Domains	r-Value	P-Value
Sociability	-0.19	<0.001*
Emotionality	-0.13	0.001*
Energy_Score	-0.16	<0.001*
Attentivity	0.01	0.95
Rhythmicity	-0.07	0.07
Total Score	-0.19	<0.001*

DISCUSSION

This study adds to growing evidence linking temperament and ECC. Out of the population examined, 53.7% of them had caries while 46.3% of them were free of caries. The subjects with caries had lower mean sociability score (10.41) compared to subjects without caries (11.3). In each of the three domains named as approach, adaptability and sensitivity threshold. Lower sociability score indicates a certain degree of shyness, restriction in communication and lower responses to changes in the child's environment. Studies have indicated that children who are extremely shy are more likely to develop a variety of behavioral problems.¹³ Preliminary evidence suggests that the parent's capacity to control the child's conduct may be influenced by the temperament of the child and ultimately influence the, daily frequency, amount, timing and content of the feeding,

possibly set the Early Childhood Caries progress stage and its evolution.¹⁴ Studies have also stated that low adaptation shows that these children's attitudes regarding nutritional measures and preventative are harder to change, making them more vulnerable to caries.¹⁵

The second temperament characteristic that was assessed was emotionality which comprised of quality of mood and persistence. The amount of pleasant and cheery conduct (positive mood), as opposed to fussy, sad, and unpleasant behavior, is referred to as mood quality (negative mood). It indicates a comparison between number of joyful, pleasant and friendly behavior with number of unfriendly and unpleasant, behavior. Persistence mentions a child's ability to persevere in the face of adversity.¹⁶ The subjects with caries had lower mean emotionality scores (7.45) compared to subjects without caries (8.16). This was statistically significant in both the components of emotionality namely mood and persistence.¹⁷ In our study there was a substantial link between perseverance and prevalence of caries in preschool children. This is in contrast with a similar study done among preschoolers which found no statistically significant correlation between emotionality scores including mood and persistence. However, they state that children with dental caries had a persistent negative mood.¹⁰

The third component that was assessed was energy scores. It included activity and intensity of reactions. The child's physical energy is measured by their activity level. It gives the proportion of active time periods to inactive time periods. The energy level of response either it is positive or negative is measured by intensity of reaction.¹⁶ The subjects with caries had lower mean energy scores (8.11) compared to subjects without caries (8.56). In the activity component, it was statistically significant ($p < 0.001$) whereas in case of intensity component not present any statistical significant difference between the two categories. A similar study done also showed lower energy scores in children having caries which however was not statistically significant.¹⁵ It has also been suggested that lack of sleep might have a negative impact on the child's temperament as well as their ability to adapt their functioning and interaction with others along with their parents.¹⁷ But the results of our study was in contrast with another study wherein they found that children with S-ECC were active and restless and was most frequently calmed by having a sip from the bottle. Fifty five percent mothers reported about the activeness of children with S-ECC however only 17.5% mothers reported about caries- free children ($p < 0.001$).¹⁸

The fourth temperament component that was assessed was Attentivity, which includes distractibility and attention span. Distractibility refers to whether the child gets diverted from what he is doing or may ignore outward disruptions and continues the current activity. It represent the degree to which stimuli in the environment alter behavior.¹⁶ The attentivity scores of children with caries (1.67) was lower than that of non-carious group (1.79). However this was not statistically significant ($p = 0.36$). Overall a no link was found with attentivity in the current research. This is contrasting with the results of another study where they had observed less attentivity scores in

carious group which had suggested fleeting attention and more distractibility in contrast with non-carious group.¹⁵ Studies have suggested that the primary influence on length of attention span includes the age of the child. It is a generally accepted idea that attentivity of preschool and primary-grade children are limited to ten to fifteen minutes.¹⁹

The fifth domain that was assessed was Rhythmicity. In the present study, the rhythmicity domain had not shown any statistical substantial difference between carious and non-carious group. Rhythmicity refers to the predictability of children's biological and behavioral patterns.¹⁵ It signifies the regularity of basic functions such as hunger, excretion, sleep and wakefulness. In this study the subjects with caries had lower rhythmicity scores (3.65) compared to subjects without caries (3.82). However, this was not statistically significant ($p=0.06$).

The outcomes of our research is in accordance with another study done wherein they found less rhythmicity score in children of carious group even though the difference was statistically significant. They had suggested that it reflects irregular and less predictable biological functions in subjects with caries.¹⁰

The overall study shows tendency that could be used to determine the link between prevalence of Early Childhood Caries and child's temperament. But one study did not find any differentiation in the temperaments between the two groups of children with Baby Bottle Tooth Decay and group of children without Baby Bottle Tooth Decay as compared to the current research.²⁰ Similar results were also given by de Oliveria et al where they presumed that there was no substantial difference regarding the disposition of child with and without caries.²¹ But other studies done by Jabin Z et al.¹⁰ (2014), Aminabadi N et al.²² (2014), Quinonez et al.¹⁴ (2001) showed significant correlation between child temperament and early childhood caries.^{3,8,15} Since temperament is a reflection of the speed and intensity of behavioral responses to stimuli, it can be a potential barrier to good oral health practices

CONCLUSION

There was a significant correlation between child temperament scores of Sociability, Energy and Emotionality and Caries Severity Index scores. No correlation could be established with Attentivity and Rhythmicity scores. It can be concluded that in early childhood caries child temperament is a risk factor.

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