

Association of Child Temperament with Early Childhood Caries

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ABSTRACT

Background: Psychological variable may affect early childhood caries (ECC), but this aspect has not been explored satisfactorily. This study evaluates the child temperament as a risk predictor for ECC.

Aim: To find the association of child temperament with ECC.

Settings and design: The study is a cross-sectional survey of 1300 school children aged 3 - 6 years from Moradabad city. This survey was conducted during March 2008 to April 2009. The survey assessed the child temperament and analyzed its association with ECC.

Materials and Methods: Children were examined for the evidence of caries, using dmft (decayed missing filled teeth) index based on W.H.O standard criteria (1997). Child temperament was assessed on the basis of five factors; namely, Sociability,

Emotionality, Energy level, Attentivity and Rhythmicity using Malhotra Temperament Schedule MTS. Statistical Package for Social Sciences (SPSS) was used to analyse the data. Significance was deemed at $p \leq 0.05$.

Results: Out of 1,300 parents involved in filling questionnaire for assessment of child temperament, 1053 (81%) responded and their children were included in study. No caries were found in 731 (69%), while 322 (31%) had evidence of caries in one or more teeth. Of the five temperament factors, Sociability, Energy score, Attentivity and Rhythmicity significantly associated with ECC levels. No correlation could be established with emotionality.

Conclusion: The children with ECC were found less sociable, less energetic, highly distractible and less rhythmic as compared to children without ECC.

Keywords: Child behaviour, Early childhood caries, Malhotra temperament scale, Risk factors, Temperament

INTRODUCTION

Early childhood caries is a common disease of young children. Though it is not life-threatening, yet it contributes to suboptimal health and failure to thrive [1,2]. American Academy of Paediatric Dentistry defines ECC as "the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces" in any primary tooth in a child 71 months of age or younger [3,4].

Allport defined temperament as "the characteristic phenomenon of an individual's nature including his susceptibilities to emotional stimulation, his customary strength and speed of response and the quality of his prevailing mood" [5]. Though temperament is considered a genetic determinant that remains stable across lifetime, but interestingly, it is also modifiable by environmental influences [6-8].

It was the pioneering work of Thomas and Chess in New York (1963, 1968) which followed a group of children from birth through childhood, adolescence and early adulthood. They demonstrated evidence for temperament individuality of children that was manifested right in infancy and remained relatively stable in childhood and adolescence [9]. But in the present conditions normally mothers are going out for work and most of the children are brought up by caregivers that can indirectly affect the child's behaviour and temperament.

Temperament can be defined as a child's innate personality or behavioural style. It is, in essence, how he or she communicates or interacts with the environment.

Association of ECC with factors like oral hygiene, diet, socio-economic status and parental stress have been studied in detail. However, the role of psychosocial variables like child temperament, parenting stress as risk factors to caries remains unexplored. The authors therefore undertook that study to evaluate the impact of childhood temperament and dental caries.

AIM

This study was conducted with the aim of assessing the effect of child temperament as a risk factor for childhood caries in children from 3-6 years of age.

The objectives of study are:

1. To study the impact of sociability on early childhood caries,
2. To study the impact of emotionality on early childhood caries,
3. To study the impact of energy score on early childhood caries,
4. To study the impact of attentivity on early childhood caries,
5. To study the impact of rhythmicity on early childhood caries.

MATERIALS AND METHODS

This study was conducted to assess the association of child temperament with early childhood caries in preschool children of Moradabad city, India.

1. Study Design:

- i. Type of study:** Study is designed to be a cross-sectional survey to assess the temperament and its correlation with ECC of three to six years children in educational setup.
 - ii. Sample Size:** Sample size was estimated at 1,300 to give a precision of 3% at 95% confidence interval.
 - iii. Pilot Study:** A pilot study was conducted on 20 preschool children and their parents of Moradabad City. A group of subjects in the age group of three to six years were selected and examined according to the criteria set for the study.
2. Tools for assessment of temperament: In the present study temperament was assessed on the basis of these five variables-
- i. Factor 1 (Sociability):** Comprises of three variables, i.e, approach withdrawal, adaptability and threshold of responsiveness. Mean score of these three variables are summed to give the sociability score. The range of possible score is 3-15. High scores on this indicate that the child is quite responsive to the environment, adjustable, adaptable and uninhibited [9].

The variable adaptability measures that how easy or difficult it is to alter a child's behaviour. A very adaptive child will respond directly to parent's instructions even if it is against the child's own inclinations,

S. No	Part	Without caries (n=731)		With caries (n=322)		"p"
		Mean	SD	Mean	SD	
A.	Approach/withdrawal	16.80	3.52	16.30	3.61	0.030
B.	Adaptability	19.13	3.43	18.42	3.53	0.002
C.	Threshold of responsiveness	14.37	3.01	13.92	3.10	0.029
Total sociability score		50.54		48.64		0.005

[Table/Fig-1]: Sociability

S. No	Part	Without caries (n=731)		With caries (n=322)		"p"
		Mean	SD	Mean	SD	
A.	Mood	20.38	3.89	19.66	3.57	0.003
B.	Persistence	15.50	4.74	16.02	4.99	0.114
Total emotionality score		35.88		35.68		0.121

[Table/Fig-2]: Emotionality

S. No	Item	Without caries (n=731)		With caries (n=322)		"p"
		Mean	SD	Mean	SD	
1.	Activity	17.97	3.98	17.75	4.01	0.409
2.	Intensity	18.67	5.48	17.62	5.91	0.006
Total energy Score		36.64		35.37		0.012

[Table/Fig-3]: Energy Score

S. No	Item	Without caries (n=731)		With caries (n=322)		"p"
		Mean	SD	Mean	SD	
1.	Ease to change mood	3.99	1.74	4.32	1.80	0.005
2.	Ability to be distracted	4.20	1.60	4.33	1.51	0.207
3.	Ability to be consoled	4.04	1.71	4.28	1.68	0.034
4.	Response when engaged in some interesting task	2.25	1.26	3.08	1.29	0.010
5.	Response when some child takes away his toy or book or any other possession	3.48	1.62	3.76	1.73	0.013
Total attentivity (Fleeting attention) score		17.96		91.77		0.0004

[Table/Fig-4]: Attentivity (fleeting attention)

whereas a poorly adapting child does not modify his or her behaviour despite frequent attempts at intervention by a parent.

- ii. **Factor 2 (Emotionality):** This is constituted by two variables i.e. mood and persistence. Sum total of the mean scores of these two variables gives the emotionality score. The possible range of score is 2-10. High emotionality score indicates generally positive, happy mood and vice versa.
- iii. **Factor 3 (Energy):** There are two temperament variables activity and intensity, which constitute this factor. High score means more physical as well as psychological energy exhibited in the child's behaviour and vice versa. Range of score possible is 2-10 [9].
- iv. **Factor 4 (Attentivity):** It comprises of only one temperament variable i.e. distractibility. It basically denotes attention span and has been named as attentivity. High scores indicate fleeting attention and high distractibility. Range of scores is 1-5 [9].
- v. **Factor -5 – (Rhythmicity):** Rhythmicity has been designated as such and retained as the fifth independent factor. The possible range of scores is 1-5. High scores indicate regular and predictable biological functions and low score mean irregularity [9].

In the present study temperament was assessed on temperament measurement schedule (Malhotra and Malhotra 1988) which is an Indian adaptation of Thomas and Chess's parent temperament

S No	Item	Without caries (n=731)		With caries (n=322)		"p"
		Mean	SD	Mean	SD	
1.	Regular appetite	3.42	1.96	3.12	1.99	0.0024
2.	Regularity in amount of food intake	3.43	1.63	3.21	1.59	0.0040
3.	Regular sleep	3.39	1.60	3.13	1.53	0.0012
4.	Change in period of sleep on weekends or holidays	2.87	1.34	2.94	1.43	0.455
5.	Regular bowel movements	3.60	1.56	3.38	1.52	0.0032
Total rhythmicity score		16.71		15.78		0.0023

[Table/Fig-5]: Rhythmicity score

questionnaire. It is a bilingual scale (English and Hindi) measuring nine temperament variables described by Thomas and Chess (1968) through 5 items each, enquiring about the behaviour of the child in routine life situations relevant to our population [9].

MTS (Malhotra Temperament Scale) differs from the original parent interview schedule of Thomas, Chess and Birch (1968) in that it is based on situations that are applicable to Indian setting, the language has been changed to Hindi to keep the functional equivalence of the terms and that it finally derives five factors (Sociability, Emotionality, Energy Score, Attentivity, Rythmicity) from the nine variables measured.

Each item is rated on a 5 point scale with considering both the intensity as well as the frequency of occurrence of that particular behaviour. Scores of 1-5 represent the extremes of intensity and frequency of occurrence of that behaviour rated on negative and positive directions. Score of 3 at the midpoint represents average as per the parent's perceptions [9].

The two earlier studies [10,11] used the Toddler Temperament Scale (TTS) and the Behaviour Style Questionnaire (BSQ) to measure temperament but because of its shorter length the MTS temperament survey used in the present study may be more user friendly measure (20 items) than the TTS and BSQ (100 items each).

3. Ethical Clearance and Study Approval: The study was reviewed and cleared by the ethical committee of Kothiwal Dental College and Research Center Moradabad Permission to conduct the survey in selected schools of Moradabad was obtained from the respective school authority.

4. Organization of survey

- i. **Schedule of the survey:** The study was scheduled over a period of one year from March 2008 to April 2009.
- ii. **Calibration and training:** The clinical examination of every child was done by or carried out by an investigator. Examination criteria employed was the dentition status and treatment needs proposed by WHO (1997).
- iii. **Lighting:** The examination was performed under the natural light. The subjects were positioned so as to receive maximum natural illumination through open window.
- iv. **Method of obtaining data:** Ten schools of Moradabad City were randomly selected from the list to make the sample of 1300 children aged 3 - 6 years attending preschool and their parents were included in the study. A child Temperament Questionnaire, Malhotra temperament schedule MTS was translated in Hindi and written in Devnagri script (local vernacular language of the area) for collecting the required and relevant information on child temperament. Since, these variables are not included in the study so these lines should be removed from the text. Questionnaire along with the consent form were distributed to the children, to be taken to their houses. Parents were requested to fill these questionnaires and return back the next day.

- v. **Instruments and supplies details of clinical examination armamentarium:** The following materials were used for the study.
- Plain mouth mirror
 - Tweezer
 - Moon's probe
 - Kidney tray
 - Disposable gloves
 - Disposable mouth mask
 - Sterile gauze and cotton rolls.
- vi. **Infection Control:** The diagnostic instruments were sterilized using autoclave in the department before going for survey. Surface disinfectants were taken to clean the surface near the examination area or wherever necessary.

RESULTS

Parents of 1,300 children were examined for ECC and provided with study questionnaire and requested to complete the same. A total of 1,053 parents (81%) responded to questionnaire and were retained for analysis. No caries found in 731 (69.4%) study subjects, while 322 (30.6%) had evidence of caries in one or more teeth. The correlation of ECC studied with each parameter of temperament.

Sociability: Children with caries were found less social (48.6%) as compared to non-carious groups (50.5%). The difference was statistically significant ($p \leq 0.005$) in all the three components of sociability namely approach, adaptability and threshold of responsiveness [Table/Fig-1]. Adaptability segment of sociability has most obvious difference ($p = 0.002$).

Emotionality: Children with caries had an emotionality score of 35.7 compared to 35.9 in non-carious children. Overall no statistically significant correlation observed between ECC and emotionality ($p = 0.121$). However the mood component has statistically significant correlation with ECC (p value = 0.003) indicating the children with caries had irritable behaviour [Table/Fig-2].

Energy Score: Children with caries did not show any statistical correlation with overall energy levels ($p = 0.012$), however both component of energy scores were lower (35.4 in children with ECC and 36.6 in non-carious), indicating these children been less energetic as compared to non caries group [Table/Fig-3].

Attentivity (Fleeting attention): Children with caries were found to have higher attentivity score (91.8) as compared to non-carious (18.0) with p value of 0.0004 indicating fleeting attention and easily more distractible nature as compared to non caries group [Table/Fig-4]. The score is statistically significant correlation for mood change, ability to console, response when engaged in some interesting task, and promptness to response components of attentivity. The ability to be distracted was not found to have statistically significant correlation with ECC.

Rhythmicity Score: Subject with caries had fewer score in rhythmicity 15.8 as compared to non-carious (16.7) indicating irregular, unpredictable biological functions in children with ECC ($p = 0.002$). The score has statistically significant values for appetite, amount of food intake, sleep, and bowel movement. This indicates children with caries were irregular as compared to non caries group [Table/Fig-5].

DISCUSSION

In the present study, children with caries were found to be less sociable, moderately emotional, less energetic, highly distractible and are less rhythmic. This means the study population demonstrated high preference for being alone than in company, shows moderate crying/ tantrums, low rates of speaking and moving, have fleeting attention and possess irregular biological functions.

In this study low score of sociability among carious group signifies low approach, low adaptability and low threshold of responsiveness. The variable approach/ withdrawal refer to a child's initial reaction to unfamiliar situations, such as a new person or environment. A child who is very approachable is not shy and will speak to strangers. A withdrawn child will not speak to a stranger when spoken to, withdraws physically, looks scared or frightened and may even cry [6]. Approach / withdrawal significantly predicted all struggling behaviour. Children who were less approachable or more withdrawn exhibited more disruptive behaviour during dental treatment [6].

Present study's result showed that low adaptability and low adjustability comprised of the carious group children which signifies that these children's attitude towards the preventive and dietary measures is difficult to modify which render more susceptible for developing carious lesions.

No correlation was observed with emotionality in total in the present study. However it was found that the children with caries were unhappy and had persistent negative mood. This suggested that owing to the caries experience they would have become irritable and is persistently in bad mood. These findings justify the low self-esteem and emotional weakness of the children of caries group.

This study observed low energy level among the children with caries as compared to non-carious children. On the other hand due to debilitating effects of ECC and due to pain and suffering which the carious group children were going through they showed less activity & intensity and are thereby less energetic and active as compared to caries free children and the difference is statistically significant.

This study shows that sleep deprivation due to caries and disturbed sleep may also contribute to such behaviour as stated by Kagan et al., that sleep deprivation may affect the child's temperament negatively and compromise the child's adaptive functioning and interactions with others, including parents.

Carious group children in the present study exhibited less attentivity scores, indicating more distractibility and fleeting attention as compared to non-carious group.

Present study indicates less rhythmicity score observed in children with caries, reflecting irregular and less predictable biological functions as compared to caries free children.

Moy [11] also found similar clinical results and reported strong temper in children with ECC. While very insightful in their ideas and suggestions, these studies consisted of small sample sizes as compared to present study which has a bigger sample size.

Santos et al., have established that from a clinical point of view parental perceptions may be just as important as the child's actual temperament which is in accordance to our study [12].

In yet another study researching the strong tempered profile and parental feeding practices, Quinonez et al found that shyness and duration of feeding habit were risk factors for ECC.

Marino [13] found that children with bottle caries were more likely to be living in a single parent household. A higher incidence of sleep difficulties and strong temper were found in children more likely to take the bottle to bed.

Aczmarek [14] found significantly higher intensity decay were characterized by children with high levels features of impulsiveness and children with low level features of sadness which is in agreement to the present study.

Hayes et al., [15] found that preschool aged night wakers were rated as high in intensity in parents' ratings of the Carey Temperament Scale.

Higher score of intensity and activity among caries free children suggests that more physical as well as physiological energy is exhibited in child's behaviour [16].

William CB suggested that poor modulation of regulatory behaviours such as sleep, ingestion, elimination or arousal could be expressed as rhythmicity problems [17].

Kendrick et al., [10] concluded that there is no difference in the temperaments between the group of children with Baby Bottle Tooth Decay and the comparison group of children without Baby Bottle Tooth Decay which is in contrast to the present study.

Roy et al., [18] investigated the gender differences in temperament. It was found that girls were less socially desirable than boys. Boys had higher activity level and non adaptability and as far as threshold level was concerned girls were rated as more sensitive.

Hayes et al., [15] examined associations among temperament and sleep measures of 67 children. Temperamentally, bed sharers were found to be more intense and exhibit less adaptability and rhythmicity which corroborates with the present study.

Malhotra and Kaur [19] showed that children of psychotic as well as neurotic parents had low sociability, i.e., were withdrawing and less adaptable, lower emotionality (persistently negative mood), lower energy, i.e., less activity and less intensity of emotions, low distractibility and less regular biological rhythms.

CONCLUSION

Study found statistically significant correlation of ECC with sociability, energy score, attentivity and rhythmicity. No such correlation was found with Emotionality.

It can be concluded that the children with ECC are less sociable, less energetic, highly distractible and less rhythmic as compared to their non-carious counter parts.

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