

Association between Parental Stress and Early Childhood Caries Experience among Preschool Children in Maduravoyal, Chennai: A Cross-sectional Study

Shilpa Mahapatra¹, Preetha E Chaly², Mohammed Junaid³, Smruti C Mohapatra⁴, Madhumitha M⁵

ABSTRACT

Background: In recent decades stress has emerged as a variable of significant interest in the examination of oral health.

Objective: To study the association between parental stress and early childhood caries experience among 3–5 years old children.

Methods: A cross-sectional study was conducted among 342 randomly selected mother-child dyads in Maduravoyal, Chennai. The mothers were stratified into four stress categories based on their parental stress scores from the Parental Stress Scale (Berry and Jones, 1995). The children were classified into three subgroups, no caries [dmft = 0], low caries [dmft = 1-2], and high caries [dmft ≥ 3]. Chi-square test with Yates' continuity correction and Spearman's rank correlation were used as statistical test methods.

Results: Among the mothers with no stress, 44.9% had children in the no caries group, compared to 21.6% in the low caries and 7.3% in the high caries group [$p < 0.001$]. And among the mothers with mild to moderate stress, 6.3% had children in the no caries group, compared to 5.4% in the low caries and 30% in the high caries group [$p < 0.001$]. A positive correlation between parental stress and early childhood caries experience was observed [$\rho = 0.461, p < 0.001$].

Conclusion: A significant moderate positive correlation between parental stress and early childhood caries experience was observed. Stressful parents can be a probable risk factor for early childhood caries. Hence, providing prenatal counseling will be of added value to all expecting mothers.

Keywords: Child, Correlation of data, Dental caries, Mothers, Preschool.

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INTRODUCTION

Even in the most buoyant, confident, and optimistic parts of the world, stress has become so common that it has become a way of life.^{1,2} Parenting stress has been defined as the difficulty that arises from the demands of being a parent.^{3,4} In Eastern countries like India, primarily the mothers are responsible for raising children at home and are more fretful than fathers about the mental, psychological, social as well as behavioral problems involving their children.⁵ Children under the age of 5 years spend most of their time with their mothers and it is during this time that the earliest childhood routines and habits are acquired.⁶

Early childhood caries [ECC] is one of the most significant dental public health problems in developed and developing countries alike, that adversely influences the overall health and oral health related quality of life of the child.⁷ According to the American Academy of Pediatric Dentistry, 1994, the disease of ECC is the presence of one or more decayed, missing [due to caries], or filled tooth surfaces in any primary tooth in a child 71 months of age or younger.^{8,9} The prevalence of ECC in Chennai varied from 60 to 83% in recent studies.^{10,11} Risk factors like, colonization by *Streptococcus mutans*, prolonged and night time bottle feeding and frequent consumption of cariogenic food have already been associated with ECC.¹²⁻¹⁴ However, the impact of parental stress on ECC experience is yet to be studied, especially in an Indian population where the cultural values and parental upbringing are unlike the western countries. Hence, this study was conducted to explore the association of parental stress with ECC experience among the preschool children of Maduravoyal locality in Chennai city.

¹Public Health Dentistry, SCB Dental College and Hospital, Cuttack, Odisha, India

^{2,3}Public Health Dentistry, Meenakshi Ammal Dental College and Hospital, Chennai, Tamil Nadu, India

⁴Orthodontics and Dentofacial Orthopedics, Hi-Tech Dental College and Hospital, Bhubaneswar, Odisha, India

⁵Public Health Dentistry, JKK Nattraja Dental College and Hospital, Kumarapalayam, Tamil Nadu, India

Corresponding Author: Shilpa Mahapatra, Public Health Dentistry, SCB Dental College and Hospital, Cuttack, Odisha, India, Phone: +91 8763968214, e-mail: doctor.shilpaa@gmail.com

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MATERIALS AND METHODS

A cross-sectional study was carried out among the 3–5 years old school going children from seven private schools of Maduravoyal locality of Chennai city, in June-July, 2015. Children from government schools were excluded as permission to conduct the study was not granted by the school authorities. Only children who resided with their parents and were present on the day of the examination were included in the study. Medically compromised subjects, children with developmental anomalies, physically and mentally challenged

children as well as uncooperative subjects were excluded from the present study. The ethical clearance was obtained from the Institutional Review Board [MADC/IRB/2015/126]. Parents of the study subjects were then explained about the purpose and the study procedure, subsequent to which an informed consent was obtained from them.

The mothers were asked to complete a self-administered, closed-ended, likert scale based, Parental Stress Scale questionnaire, developed by Berry and Jones¹⁵ when they came to pick-up or drop their children. Based on their response to the questionnaire, the Parental Stress Score was calculated, following which they were categorized into the following stress levels: Group 1 [Parental stress score 18-36] - No stress; Group 2 [Parental stress score 37-55] - Borderline stress; Group 3 [Parental stress score 56-72] - Mild-Moderate stress and Group 4 [Parental stress score 73-90] - Moderate -Severe stress. The children then underwent a clinical oral examination and the parents were notified about their wards' oral needs.

Content validity as well as test-retest reliability of the questionnaire was carried out prior to the study. The questionnaire was first assessed for its content with relation to the Indian context by five experts in the field of dentistry and dental public health. The content validity index [CVI] score was found to be acceptable [0.82]. It was then translated into Tamil, the regional language of Chennai. Assessment of the test-retest reliability of the questionnaire was carried out among 20 mothers who had reported to the institution for the treatment of their wards. The questionnaire was administered on two occasions separated by an interval of 2 weeks. The validity of the translation was verified by experts in both Tamil and English. Internal consistency reliability of the questionnaire was established as excellent [Cronbach's alpha = 0.9].

Prior to the present study, a pilot study was carried out on 100 randomly selected preschool children.

Sample size was calculated using the following formula:

$$n = 4PQ/L^2$$

Where "n" is sample size.

P: is proportion

Q: 1-P

L: is the difference [precision]

By substituting the values of ECC experience [P] as 69.6% obtained from the pilot study and L as 0.05 in the above mentioned formula, the minimum required sample size calculated for the main study was 338.

A list of private schools having preschool children in Maduravoyal locality was obtained from the Directorate of Public Instructions, Chennai. From the list obtained, random selection of the schools was carried out through lottery method till the desired sample size was achieved. All the mother-child dyads who fulfilled the inclusion and exclusion criteria were then recruited from the selected schools. This reached a sample size of 342 which was more than the required sample of 338. The presence or absence of decayed tooth was

assessed by a single trained examiner using the criteria described by the World Health Organization.¹⁶Based on their ECC experience the children were classified into; no caries group [dmft = 0], low caries group [dmft = 1-2], and high caries group [dmft > 2].

The data obtained was analyzed using SPSS Version 21 [IBM Corp., Chicago, USA]. Chi square test with Yates' continuity correction was used to analyze the association between parental stress and ECC experience and their correlation was evaluated using Spearman's rank correlation.

RESULTS

The demographic data of the study population and the stress levels of the mothers have been projected in Table 1 and Table 2 respectively. Among the study subjects, 46.2% had no ECC, 21.6% had low, and 32.2% had high ECC experience. The overall ECC experience among the preschool children in the present study was 53.8% with a mean dmft of 2.2 ± 3.16. The mothers' responses to the parental stress questionnaire have been displayed in Table 3.

As observed in Table 4, among the mothers with no stress, 44.9% had children in the no caries group, compared to 21.6% in the low caries and 7.3% in the high caries group [$p < 0.001$]. And among the mothers with borderline stress, 48.7% had children in the no caries group, compared to 70.3% in the low caries and 62.7% in the high caries group [$p < 0.001$]. A total of 6.3% of the mothers with mild to moderate stress had children in the no caries group, compared to 5.4% in the low caries and 30% in the high caries group [$p < 0.001$]. The present study also revealed very highly significant moderate positive correlation between parental stress and ECC experience of the children [$\rho = 0.461$] [Figure 1].

DISCUSSION

The present study was one of the few studies to investigate the impact of parental stress on ECC experience in an Indian scenario. As the mean dmft of 5-year-old children in the 2003 National Oral Health Survey was reported to be 2,¹⁷ a dmft value of higher than 2 was selected to define high dental caries. In the present study, most of the mothers had stress, which could be due to family, financial, work, or relationship problems. Fernandes et al.,¹⁸ in a study among mothers in Udipi documented that, most of the mothers sometimes felt that they were tired and worn out, and majority of the working antenatal mothers were sometimes easily irritated and felt that they did not have enough strength.

Table 2: Distribution of the study subjects based on parental stress score

| Stress level | N (%) |
|------------------------|------------|
| No stress | 95(27.8%) |
| Borderline stress | 198(57.9%) |
| Mild-moderate stress | 47(13.7%) |
| Moderate-severe stress | 2(0.6%) |
| Total | 342 |

Table 1: Distribution of the study subjects based on their age and gender

| Age (years) | Gender | | Total N (%) |
|-------------|--------------|--------------|-------------|
| | Male | Females | |
| 3 | 59 | 44 | 103(30.1%) |
| 4 | 63 | 61 | 124(36.3%) |
| 5 | 53 | 62 | 115(33.6%) |
| TOTAL | 175 (51.17%) | 167 (48.83%) | 342 |



Table 3: Comparison of the responses of the mothers to the Parental Stress Scale questionnaire (N = 342)

| Question | ECC level (N = 342) | | | p-value |
|--|---------------------|------------|-------------|---------|
| | No caries | Low caries | High caries | |
| 1. I am happy in my role as a parent | 67.7% | 52.7% | 43.6% | 0.003* |
| 2. There is little or nothing I wouldn't do for my children if it was necessary | 61.4% | 52.7% | 40.9% | 0.003* |
| 3. Caring for my children sometimes takes more time and energy than I have to give | 5.7% | 6.8% | 20.9% | <0.001* |
| 4. I sometimes worry whether I am doing enough for my children | 6.3% | 6.8% | 15.5% | <0.001* |
| 5. I feel close to my children | 52.5% | 33.8% | 25.5% | <0.001* |
| 6. I enjoy spending time with my children | 59.5% | 41.9% | 33.6% | <0.001* |
| 7. My children are an important source of affection for me | 60.8% | 54.1% | 31.8% | <0.001* |
| 8. Having children gives me a more certain and optimistic view for the future | 58.9% | 54.1% | 34.5% | <0.001* |
| 9. The major source of stress in my life is my children | 3.2% | 5.4% | 16.4% | <0.001* |
| 10. Having children leaves little time and flexibility in my life | 1.9% | 8.1% | 17.3% | <0.001* |
| 11. Having children has been a financial burden | 15.8% | 6.8% | 15.5% | 0.001* |
| 12. It is difficult to balance different responsibilities because of my children | 7.6% | 10.8% | 12.7% | 0.005* |
| 13. The behavior of my children is often embarrassing or stressful to me | 10.1% | 21.6% | 29.1% | <0.001* |
| 14. If I had it to do over again, I might decide not to have children | 19% | 28.4% | 37.3% | <0.001* |
| 15. I feel overwhelmed by the responsibility of being a parent | 24.1% | 10.8% | 17.3% | 0.01* |
| 16. Having children has meant having too few choices and too little control over my life | 43.7% | 48.6% | 52.7% | 0.003* |
| 17. I am satisfied as a parent | 67.7% | 48.6% | 40.9% | 0.001* |
| 18. I find my children enjoyable | 68.4% | 58.1% | 43.6% | 0.008* |

*p value <0.05 is significant

Table 4: Comparison of ECC experience of the children based on the parental stress levels (N=342)

| Stress level | ECC experience | | | p-value | Total |
|------------------------|----------------|-----------------|------------------|---------|-------|
| | No caries n(%) | Low caries n(%) | High caries n(%) | | |
| No stress | 71(44.9%) | 16(21.6%) | 8(7.3%) | <0.001* | 95 |
| Borderline stress | 77(48.7%) | 52(70.3%) | 69(62.7%) | | 198 |
| Mild-moderate stress | 10(6.3%) | 4(5.4%) | 33(30%) | | 47 |
| Moderate-severe stress | 0(0%) | 2(2.7%) | 0(0%) | | 02 |
| Total | 158 | 74 | 110 | | 342 |

*p value <0.001 is very highly significant.

There are many personal and professional issues in a mother's life that subject to stresses. Another dilemma for working women is that they always feel that home is their original domain, which they have to sustain in all circumstances. The added element of motherhood in some working females increases the possibility of acute dual-role or multiple role stress as a mother, employee, and spouse or partner.¹

In the present study, a significant positive correlation was observed between parental stress and ECC experience, which

indicates that an increase in parental stress level increases the child's dental caries. Similar results were obtained by Tang C et al.,¹⁹ among 4–5 year old children in Australia. In a study conducted by Duijster D et al.,²⁰ among 5–6 years old children in Netherlands, parents' internal belief of their ability to control their child's dental health and observed positive parenting practices on the dimensions of positive involvement, encouragement and problem-solving were important indicators of dental health in children. In another research study by Quinonez et al.,²¹ parenting

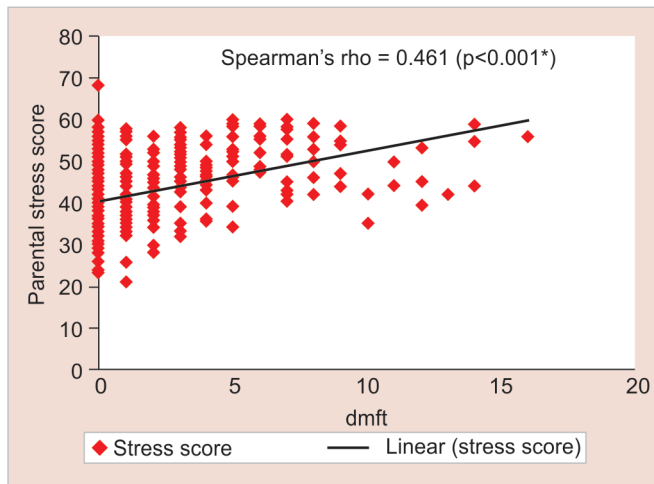


Fig. 1: Correlation between parental stress and dmft (*p value <0.001 is very highly significant)

stress was reported to be significantly correlated to the presence of dental caries and the number of carious teeth. Finlayson TL et al.,⁷ revealed an inverse relationship between parental stress and ECC experience, among 1–5 years old children in Michigan. Whereas, Jabbarifar et al., 2009³ reported no significant correlation between parental stress and ECC experience, among 4–6 years old children in Isfahan city. Stress not only distresses a single individual but the whole family. A stressed mother may have less enthusiasm and interest towards the care of her child, and may ignore the child's unhealthy oral habits. This could lead to higher ECC experience among the children with stressed mothers.

LIMITATIONS

The present study had certain limitations which should be considered when interpreting the results. The exclusion of government schools and other confounders like, overall fluoride exposure, oral hygiene practices, socioeconomic status, and number of siblings, could introduce potential sources of limits of generalizability of the findings. Moreover, as parenting is considered to be a socially patterned factor, social desirability bias could also be a major limitation of the study.

RECOMMENDATIONS

Prevention should begin in the prenatal period, continuing with the mother and the child during preschool in collaboration with the pediatrician, pediatric dentist, and teacher. Furthermore, oral health programs targeting the mothers, caregivers, community health workers, preschool teachers, and children should be planned and implemented.

CONCLUSION

Hence, the results of the present study suggest that parental stress could be a potential risk factor for ECC. Furthermore, the results suggest the need for future research to move beyond traditional risk factors and meticulously examine the impact of the social environment on oral health beliefs, behavior, and outcomes.

ORCID ID

Shilpa Mahapatra  <http://orcid.org/0000-0001-7268-3531>

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