

Original Article

# SALIVARY CORTISOL LEVELS IN MOTHERS OF CHILDREN WITH AUTISM - A BIOCHEMICAL STUDY

Anshad Mohamed Abdulla<sup>1</sup>, Amitha M. Hegde<sup>2</sup> & Manju Gopakumar

<sup>1</sup>P.G. Student, <sup>2</sup>Professor & HOD, Reader, Department of Pedodontics & Preventive Dentistry, A.B. Shetty Memorial Institute of Dental Sciences, Nitte University, Mangalore - 575 018, Karnataka, India.

Correspondence :

Amitha M. Hegde

Professor & H O D, Department of Pedodontics & Preventive Dentistry, A.B. Shetty Memorial Institute of Dental Sciences, Nitte University, Mangalore - 575 018, Karnataka, India.  
Mobile : +91 96860 90880 E-mail : amipedo9@gmail.com

**Abstract:**

**Background:** Cortisol is a hormonal marker of stress which gets released into the blood by adrenal glands during a stressful situation. Mothers of children with autism will usually be experiencing great psychological trauma and therefore will be under high levels of stress. This stress might disturb the health and normal physiology of these mothers thus there is a need for study on the stress markers like cortisol in mothers of children with autism.

**Materials and Methods:** Saliva of 20 mothers of children with autism and 20 mothers of healthy children were collected during early hours of the day ( 8 – 8.30 am) and during evenings( 4 – 4.15 pm) subjected for cortisol assay using ELISA test. **RESULTS:** Mothers of children with autism were found to have significantly lower levels of salivary cortisol throughout the day as compared to mothers of healthy children.

**Conclusion :** There is a need for interventions for mothers of children with autism

**Keywords :** Autism, Stress, Cortisol.

**Introduction:**

Cortisol is a hormonal marker of stress which gets released into the blood by adrenal glands during a stressful situation due to the activation of hypothalamic-pituitary-adrenal (HPA) axis. Cortisol follows a diurnal pattern, with high concentrations in the morning and a decline throughout the day, with the lowest levels in the evening and at night<sup>1,2</sup>. This circadian rhythm is well-established by the third month of infancy<sup>1,2</sup>. Cortisol plays an important role in various functions like glucose regulation, maintenance of immune system and also protein synthesis<sup>3</sup>. However various studies have stated that prolonged periods of stress and activation of HPA axis can cause harmful effects like suppression of immune responses, bone growth and also poor cognitive performances<sup>4,5,6</sup>.

Mothers of children with autism are usually under high levels of stress as

compared mothers of healthy children due to poor psychological well-being. Various studies in the past has attributed this state of psychological distress to the behavioural problems encountered in autistic children<sup>7,8</sup>. However very few studies highlight the impact of this stress on the health of the individual as it can affect the normal physiology of the body. The present study was undertaken to examine whether the stress experienced by mothers of autistic children affected their salivary cortisol levels.

**Materials and Methods:**

The aim of the study was to examine the diurnal pattern of salivary cortisol levels in mothers of autistic children and mothers of healthy children and to compare them.

**Sample:**

The participants consisted of 20 mothers of children with autism (study group) and 20 mothers of healthy children (control group). The participants for the study group were selected from the mothers of autistic children attending a special school in Kerala, and the participants for the control group were selected from the mothers of healthy children

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reporting for dental treatment to the Department of Pedodontics and Preventive Dentistry, A.B. Shetty Memorial Institute of Dental Sciences, Mangalore. The participants selected were mothers of the children from the age group 8-12 years.

The mean age group of mothers of autistic children were 34.05((SD±5.987) and the mean age group of mothers of healthy children were 34.9((SD±5.875).

Informed consent was obtained from the mothers and the concerned authority of the special school to conduct the study. Ethical clearance was obtained from the ethical committee of institute. Individuals who were medically compromised and who were on medication was excluded from the study.

**Procedure:**

Whole unstimulated saliva was collected from the study group and control group during early hours of the day (approx. 8 – 8.30 am) and during evenings (approx. 4 – 4.15 pm) using the Zunt method<sup>9</sup>. The individuals were instructed not to consume any food one hour prior to the collection of saliva. Approximately 5ml of saliva was collected from each participant and was refrigerated at 0 ° Celsius until it was subjected for cortisol assay using ELISA test. Diametra cortisol assay kit was used for this purpose.

Statistical analysis: The data collected were statistically evaluated using paired t test with SPSS software version 11.0.

**Results:**

**MOTHERS OF NORMAL CHILDREN (control):**

- I Levels of salivary cortisol in the morning for mothers of normal children ranged from 66 nanograms per millilitre (ng/ml) to 160 ng/ml with the mean level being 89.95 ng/ml (SD±24.894). (table.1).
- I Levels of salivary cortisol in the evening for mothers of normal children ranged from 41 ng/ml to 90 ng/ml with the mean level being 57.2 ng/ml (SD±14.384). (table.1).

**MOTHERS OF AUTISTIC CHILDREN (STUDY GROUP):**

- I Levels of salivary cortisol in the morning for mothers of autistic children ranged from 37 ng/ml to 105 ng/ml with the mean level being 58.2 ng/ml(SD±17.289).(table.1).
- I Levels of salivary cortisol in the evening for mothers of autistic children ranged from 23 ng/ml to 86 ng/ml with the mean level being 43.45 ng/ml(SD±14.94).(table.1).

The mean age group of mothers of autistic children were 34.05((SD±5.987) and the mean age group of mothers of healthy children were 34.9((SD±5.875).

**COMPARISON OF CORTISOL LEVELS IN MOTHERS OF AUTISTIC CHILDREN & NORMAL CHILDREN:**

The diurnal variation of salivary cortisol levels in the mothers of autistic children were significantly lower in morning as well as evening with a t value of 4.685 and 2.965 respectively (P<0.005). The difference in the cortisol levels from morning to evening was lower in mothers of autistic children with t value of -5.402 and p <0.001 (TABLE. 1).

Table 1 : COMPARISON OF CORTISOL LEVELS IN MOTHERS OF AUTISTIC & NORMAL CHILDREN

	GROUP	N	Mean	Std. Deviation	T	Degree of freedom	Sig. (2-tailed)
Morning	MOTHERS OF NORMAL CHILDREN	20	89.95	24.894	4.685	38	<0.001
	MOTHERS OF AUTISTIC CHILDREN	20	58.2	17.289			
Evening	MOTHERS OF NORMAL CHILDREN	20	57.2	14.384	2.965	38	0.005
	MOTHERS OF AUTISTIC CHILDREN	20	43.45	14.94			
MOMDIFF	MOTHERS OF NORMAL CHILDREN	20	-32.75	13.1224	-5.402	38	<0.001
	MOTHERS OF AUTISTIC CHILDREN	20	-14.75	7.06269			

**Discussion:**

Salivary cortisol levels were assessed in this study as they reliably reflected the circulating hormonal levels and thereby giving a fair amount of knowledge about the adrenal activity in a non-invasive manner<sup>6,10</sup>.

The salivary cortisol levels followed a normal diurnal rhythm in the mothers of healthy children; i.e. the levels were high in the morning and decreased in the evening. The mothers of children with autism showed lower salivary cortisol levels both in the morning as well as in the evening

on comparison with mothers of healthy children. This cortisol profile of HPA hypo activity is in contrast to the profile exhibited during an acute stressful situation but is similar to the profile exhibited by people experiencing chronic stress like parents of children with cancer, individuals experiencing posttraumatic stress disorder and soldiers in battle<sup>11,12,13</sup>.

As the present study was undertaken for a single day it cannot be conclusively said that mothers of children with autism can be added to the above mentioned groups experiencing chronic stress but it gives a hint about the possible physiologic interactions that chronic stress causes in this group of individuals. Further this hypo activity of cortisol hormone can have several detrimental effects like attentional problems, fatigue<sup>6</sup> etc.

In future it would be valuable to assess cortisol patterns in mothers of young children with autism who have had a

shorter period of stress exposure than the mothers of children of older age group used in this study (8-12 years). Also the co-relation between the salivary cortisol levels and stress could be validated by conducting the present study on a larger sample size and consecutive days.

In conclusion, the present study indicated that mothers of autistic children experience chronic stress which can be due to various factors like concern for their children, anticipating behavioural problems of their children, social image etc.

Therefore interventions like behavioural modifications that reduce behavioural problems of children with autism, counselling the parents of children with autism, stress relieving exercises like meditation would enhance the health & quality of life of mothers of children with autism and thus should be one of the top priority for service provision in the families of children with autism.

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