

Collection Methods for Salivary Oxytocin Estimation in Autism Spectrum Disorders

Sowmyashree Mayur kaku^{1,2},
Satish Chandra Girimaji²,
Shoba Srinath² and
Rita Christopher³

Abstract

Oxytocin participates in the development of normal social bonds and aberrations in this neuroendocrine system have been hypothesized to contribute to behavioral abnormalities associated with autism. Salivary oxytocin level estimation is now gaining popularity in autism research. Multiple collection techniques have been tried in both high as well as low functioning children with autism. In this paper, we discuss the various techniques which have been standardized for salivary sample collection to estimate oxytocin. It will probably help augment the current research findings for use of exogenous oxytocin therapy in children with autism spectrum disorders while downplaying the ethical issues of invasive sample collection techniques for blood and cerebrospinal fluid.

Keywords: Autism spectrum disorders; Saliva; Oxytocin; Social behavior; High functioning; Assessment

1 Department of Clinical Neurosciences, National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, India 560029

2 Department of Child and Adolescent Psychiatry, National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, India 560029

3 Department of Neurochemistry, National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, India 560029

Corresponding author: Sowmyashree Mayur Kaku

✉ sowmeey@gmail.com

Department of Clinical Neurosciences and Department of Child and Adolescent Psychiatry, National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore - 560029, Karnataka, India

Tel: +919611020419, +919480829667

Introduction

Oxytocin is a Nonapeptide synthesized in the hypothalamus which is known to influence maternal behavior, maternal aggression, pair bonding and sexual behaviors [1]. Oxytocin participates in the development of normal social bonds and in humans is involved in affiliate behaviors such as nursing, mating, social attachment, bonding, social memory and support, human trust and parental behavior [2]. Aberrations in this neurochemical system may contribute for developing independence and aloofness [3], thus there is a reason to believe that disturbances in oxytocin function may be responsible for some of the behavioral abnormalities associated with Autism Spectrum Disorders (ASD) [4].

Plasma, salivary and CSF oxytocin measurements in ASD have been done in the past. Though studies using saliva are limited, the technique is gaining popularity in the last few years. We searched on PubMed, for articles related to collection of salivary sample in children with ASD using key words oxytocin, autism, autism spectrum disorder, neuroendocrine, cortisol, salivary oxytocin and saliva. Relevant articles were then reviewed for appropriate information on collection methods for salivary sample in children with ASD.

Discussion

Salivary oxytocin is a reliable biomarker of peripheral oxytocin and oxytocin levels in plasma and saliva are comparable. Studies

in parents of typical children have shown similar baseline levels of plasma and salivary oxytocin; and salivary oxytocin is known to be individually stable across observations [5]. Salivary and plasma oxytocin show medium level correlation [6,7] and therapeutic intranasal administration of oxytocin increases both plasma and salivary oxytocin [8,9]. These evidences have shown that salivary oxytocin can be considered as an alternative to drawing blood and ethical issues related to the same can be overcome [10]. It also can help to conduct experiments in real life situations in children with ASD where needles may not be feasible [11].

Collection methods

Salivary samples in adults and infants can be collected using salivettes [5,6,9]. Some studies have also used passive drool technique in adults [8]. Studies in high functioning ASD population

have demonstrated that both passive drool and salivette methods are equally acceptable by children for collecting saliva [12]. Though adults and adolescents with high functioning ASD would cooperate, problems arise in very young children and in those with low functioning autism. Their ability to understand the methodology involved in collecting saliva using salivettes or passive drool method is limited. Many children with ASD are also known to have sensory issues commonly referred to as sensory defensiveness or sensory over reactivity [13] which is a hurdle in making them retain foreign objects like straw or sorbents in their mouth for 40-60 seconds for collecting saliva [5,6].

Infants	Children and adolescents	Adults
Salivettes	Salivettes	Salivettes
	Passive drool technique	Passive drool technique
	Feed the frog technique	
	Cotton dental rolls	
	Stimulation using sugarless chewing gum	
	Desensitizing and reward	

Table 1: Saliva collection methods.

Other studies where salivary samples are collected for levels of cortisol, testosterone, etc have used methods like feed the frog technique, desensitizing the child and then rewarding after obtaining sample, collection using cotton dental rolls, collection by passive drool after stimulating the production by the use of sugarless chewing gum, etc [14-16] (**Table 1**).

Conclusion

Lower levels of oxytocin in ASD have been demonstrated many times in adult patients but only few studies have been conducted in children and adolescents with ASD. Evidences imply possible beneficial effects of oxytocin administration on autistic social and communicative dysfunctions and their neural underpinnings. Newer techniques for collection of saliva in children with ASD will be promising as they will help monitor the oxytocin treatment outcome in a quantitative non clinical approach and would enhance the current research in oxytocin supplementation. However, further extensive large-scale studies and longitudinal clinical trials to identify neurogenetic mechanisms of the therapeutic effects of oxytocin are also needed [8,10,17]

Conflicting interest

The authors declare there is no conflict of interest.

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