International Journal of Science and Research (IJSR) ISSN: 2319-7064 SJIF (2022): 7.942

# Oral Sensory Thermal Test in Autism with Apraxic Individual: A Single Case Study

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Abstract: Oral sensory issues is one of the most common factor that can be notice in Children with Autism Spectrum Disorder. Recent studies stated that children with Autism could not speak due to limited oral proprioception. The aim of the study was to administered whether the child can identify and discriminate the temperature/taste of different stimulus. In this study 7 year male was selected to check oral sensory test while using thermal stimulation with different text and texture followed by child sensory profile (SP - 2) and it was single subject study design. The result Indicate that the child has limited proprioception of texture and taste mostly in external part of lips, simultaneously when taste mix with saliva therefore it difficult for individual which region of oral cavity perceived the taste in ASD population. A large number of sample with adequate stimulus could be select in future which could give details information on texture and texture in specific area of oral cavity.

Keyword: Autism, Oral sensory, Apraxia, Nonverbal, Oral Proprioception, Taste, temperature, Oral Cavity

#### 1. Introduction

Autism or Autism Spectrum Disorder (ASD), is a condition that affects how individuals interact socially, communicate, and engage in behaviors and activities. It is a neurodevelopmental disorder that falls on a spectrum, meaning that symptoms can vary greatly in terms of their intensity and expression from person to person (1). It is common to notice a simultaneous presence of difficulties related to the sense of taste, communication in children with autism.

Limited oral proprioception refers to a reduced ability of individuals with autism to sense and control (2) the movements of their tongue, lips, and jaw during activities such as speaking, eating, and oral tasks. This lack of awareness can lead to difficulties in coordinating these movements, resulting in challenges with articulation, speech clarity, and oral motor skills. Additionally, it can impact an individual's ability to chew food properly and maintain good oral hygiene practices.

Apraxia is a neurological condition where individuals experience difficulties in executing purposeful and skilled movements or gestures, despite having normal motor function, sensation, and understanding. It can impact different areas such as speech (known as apraxia of speech), limb movements (limb apraxia), and fine motor skills (ideomotor apraxia). (3)

#### Aim and Objective

The prime desired of this study was to check if individual is able to identify several taste, temperature and also to check proprioception of oral cavity.

## 2. Methodology

A 7 - year - old child with severe Autism and Apraxia was included in the study after obtaining consent from the parents. The child exhibited limited oral proprioception issues and speech groping behaviors. The study aimed to assess the child's ability to identify and discriminate different thermal, taste, and texture sensations in various parts of the oral cavity using the Oral Sensory Thermal Test. Single subject study design was selected. Initially, the Child Sensory Profile (specifically the F - Oral Sensory Processing section) was administered, and then the oral sensory thermal test was conducted

**Material used:** In the study, warm water, lukewarm water, cold water, and ice water were utilized along with various taste stimuli, including sweet (sugarcane juice), sour (lemon juice), salty (saltwater), bitter (coffee powder), and umami (mushrooms). These stimuli were administered using spoons, taste buds, and gloves, with minor modifications for consistency.

**Area tested:** The lips (vermilion border), lips (buccal mucosa), teeth, alveolar ridge, hard palate, soft palate, uvula, tongue tip, mid - portion of the tongue, base of the tongue, retromolar trigone, tonsil area, gingiva (gum), floor of the mouth, frenulum of the lips, and frenulum of the tongue all played a role in perceiving temperature when consuming food or drink. The temperature receptors present in these areas detected changes in temperature and sent signals to the brain for interpretation and identification of the temperature sensation.

**Scoring:** The child was conditioned with a thumbs - up gesture representing "yes" and a thumbs - down gesture representing "no. " "Yes" was recorded as 1, while "no" was recorded as 0.

**Procedure:** The clinician initially obtained all the necessary materials and began assessing the child. A trial session lasting 4 - 5 days was conducted, during which various temperatures were applied to gauge the consistency of responses. Following the trial session, the clinician utilized a limited quantity of stimuli in multiple regions of the oral cavity.

### 3. Results

The following graph in Sensory profile test (F - section) reveal he has oral sensory processing issues

Count

5			х						
	х								
	x								
	x								
	х								
4	х	х	х	х	х	х	х	х	х
	х	х	х	х	х	х	х	х	х
	х	х	х	х	х	х	х	х	х
	х	х	х	х	х	х	х	х	х
	х	х	х	х	х	х	х	х	х
3		х							
	х								
2   x	x	x	х	x	х	x	x	х	x
x	х	х	х	х	х	х	х	х	х

In this graph, the height of each bar represents the count for the corresponding word. For example, the word "54" has a count of 4, so there are four "x" marks above the number 4 on the y - axis. Similarly, the words "55", "56", "59", "60", "61", and "63" all have a count of 4, so there are four "x" marks above the number 4 for each of these words. The words "57" and "58" have a count of 3 and 2 respectively, so there are three "x" marks above the number 3 for the word "57" and two "x" marks above the number 2 for the word "58". The words "62", "64", and "65" have counts of 2, 2, and 4 respectively, so there are two "x" marks above the number 2 for "62" and "64", and four "x" marks above the number 4 for "65". Which Indicate some of the deficits in identification and discrimination in temperature in Oral cavity

54 55 56 57 58 59 60 61 62 63

CI No	A read	Response in	Response in	Response in	Response in
51. INO	Area	warm water	lukewarm water	cold water	Ice water
1.	Lips (vermilion border)	0	0	0	1
2.	Lips (Buccal mucosa)	1	0	0	1
3.	Frenulum of lips	1	0	1	1
4.	Gingiva (gum)	0	0	1	1
5.	Alveolar ridge	1	1	1	1
6.	Tip of tongue	0	1	1	1
7.	Middle of tongue	1	1	1	1
8.	Base of tongue	1	1	1	1
9.	Frenulum of tongue	1	0	0	1
10.	Floor of mouth	1	0	0	1
11.	Hard palate	1	1	1	1
12.	Soft palate	1	1	1	1
13.	Retromolor trigone	1	0	0	1
14.	Tonsil area	1	0	0	1

After the stimulus and analysis, it was observed that certain areas of the oral cavity, such as the vermilion border, were only able to perceive the sensation of ice water. The buccal mucosa, on the other hand, could perceive both intense temperatures. However, a few areas did not exhibit significant reactions to lukewarm and cold water. This could potentially indicate an inability to recognize temperature.

Sl. No	Area	Sugarcane Juice	Lemon juice	Salt water	Coffee powder	Mushroom (umamai)
1.	Lips (vermilion border)	0	0	0	0	0
2.	Lips (Buccal mucosa)	0	0	0	0	0
3.	Frenulum of lips	0	0	0	0	0
4.	Gingiva (gum)	1	1	1	1	1
5.	Alveolar ridge	1	1	1	1	1
6.	Tip of tongue	1	1	1	1	1
7.	Middle of tongue	1	1	1	1	1
8.	Base of tongue	0	1	0	1	0
9.	Frenulum of tongue	1	1	1	1	1
10.	Floor of mouth	1	1	1	1	1
11.	Hard palate	0	0	0	0	1
12.	Soft palate	1	1	1	1	1
13.	Retromolor trigone	1	1	1	1	1
14.	Tonsil area	0	1	0	1	1

Volume 12 Issue 7, July 2023 <u>www.ijsr.net</u> Licensed Under Creative Commons Attribution CC BY In taste area lips (vermilion border) does not react to any taste stimuli, however other part response someone the tastes in several area of oral cavity. Therefore it indicated that the Autism Spectrum Disorder also has thermal and taste processing issues. Hence, While assessing ASD children thermal and taste assessment shall be conducted by Speech Language Pathologist Or Occupational Therapist.

## 4. Discussion

As one ate or drank, the tongue, soft/hard palate (the roof of the mouth), gums, inner cheeks, and even the throat all worked together to produce the sensation of warmth and taste. These sensors tracked temperature and taste variations and provided impulses to the brain in bottom to top processing way, which interpreted and registered the temperature and taste sensations in parietal lobe of brain and reacted with aversions, pushing, or other actions. The study's results indicated that a significant portion of the oral cavity was sensory receptors which responsible for temperature and taste perception and to controlled it. However, after the studies it indicated that in rare scenario the receptor for sweet/bitter/sour might be impaired which can be called as taste processing disorders, which can be seen in individual with sensory issues like ASD, ADHD, Cerebral Palsy or SPD. For future researchers collecting a larger number of samples using more accessible and advanced instruments in their studies which can help in identifying which mechanoreceptors in Oral cavity is responsible for different taste and temperature.

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DOI: 10.21275/SR23716214943