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Research Article

CORRELATION BETWEEN SALIVARY CONSTITUENTS OF FATHER AND CHILD

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ABSTRACT

Objectives: The objective of the study was to find out the correlation between the salivary amino acids and electrolytes in saliva of the father and the child. Method: Saliva was collected from nine father and child pairs by method of Passive Drooling. Qualitative amino acids analysis and electrolyte analysis of the salivary samples was done by LCMS (shimadzu 2010, single quadrupole detector with electrospray ionization).
Results: The three amino acids with highest concentration found in fathers' saliva were arginine,histidine and tryptophan while in children glycine, phenyl alanine and tryptophan were found. The only common amino acid in both groups was tryptophan. Sodium, potassium and calcium were the three ions with maximum concentration in both fathers' and children's saliva. Sodium and calcium levels were found to be comparable but the potassium levels were significantly different.
Conclusion:A definitive correlation could not be established between a father's and the child's saliva. Further investigations with large sample size and including more parameters will help us establish whether or not there is any correlation between the salivary constituents of a father and child.

Keywords:saliva, salivary constituents, free amino acids, cations, correlation, father, child

INTRODUCTION

Saliva is a unique fluid and has the potential to become the choice of diagnostic sample because of the advancements in detection technologies and a combination of clinically relevant biomolecules. Saliva is one of the most important factors in regulating oral health, with flow rate and composition changing throughout development and during disease.[1] Human saliva contains a plethora of compounds that can be informative in monitoring overall health and well-being. Components of saliva, therefore, may serve as biomarkers because the composition of oral fluid is responsive to behavioural, mechanical, genetic or ontogenetic stimuli.[2] Saliva reflects the body's state of well-being; but its use as a diagnostic aid has been negatively affected because of our lack of understanding of the salivary biomolecules and their relevance to disease etiology combined with lack of highly sensitive detection systems. Diagnosis of disease *via* the analysis of saliva is potentially valuable for children and older adults, since collection of the fluid is associated with fewer compliance problems as compared with the collection of blood.The protein composition of saliva reflects cellular signal processing that results from day-to-day environmental influences as well as from acute or chronic stress.[3]This study aims at using saliva as a diagnostic tool and finding, if any, correlation exists in major salivary components of a father and his child.

MATERIALS AND METHOD

Material List

Diagnostic instruments:
- Sterile mouth mirrors
- Sterile probes
- Sterile explorers
- Sterile tweezers
- Sterile kidney trays
- Sterile cotton
- Disposable gloves, mouth mask, head caps
- Disinfecting solutions

Instruments for saliva collection:
- Disposable plastic funnel
- Sterile glass vials
- Saliva collection tubes (Tarsen tubes)
- Ice box for storing saliva during transportation to laboratory

Equipment for salivary analysis:
- pH strips
- Measurement of salivary total protein done in laboratory using Light Chromatography coupled with Mass Spectrometry- Shimadzu LC 2010-CHT
- Measurement of salivary trace elements done by Inductively coupled plasma emission spectroscopy- Lab Pro Nich

METHOD

Written consent was taken from the subjects. Subjects were instructed not to eat or drink at least 1 hour prior to collection of the samples. Rinse mouth with tap water before sample collection. Wait at least 10 minutes after rinsing before collecting saliva to avoid sample dilution. The resting whole saliva of the subjects was collected by passive drooling into sterile glass tube, in a quiet well lit room in the morning time.[4] (Colin Dawe's method). pH of the collected salivary samples was measured using pH strips.5 ml of saliva sample was then transferred to sterile vials. The saliva containing vials were stored in an icebox and carried within 60 minutes to the laboratory where it was stored in deep freeze below -20 degree Celsius until biochemical assays are performed. The salivary total proteins was analyzed in the laboratory using Light Chromatography coupled with Mass Spectrometry. The salivary trace elements was analysed in the laboratory using inductively coupled plasma emission spectroscopy.

RESULTS

This study analyses the constituents of normal saliva in healthy individuals in two groups; group 1 comprising adult males and group 2 comprising their children. The study aims to establish whether or not there is any correlation between the salivary constituents of father and the child. The factors taken into consideration for analysis are free amino acids, cations and pH. The three amino acids with highest concentration found in fathers saliva were arginine, histidine and tryptophan while in children glycine, phenyl alanine and tryptophan were found. The only common amino

acid in both groups was tryptophan. The sodium and calcium levels in both the groups are comparable but the potassium levels are significantly different. The pH of father's saliva was found to be higher than that of the children.

Table 1 represents the findings of the analysis of human adult male saliva i.e. the fathers. Table 2 represents the findings of analysis of saliva of children.

Table 1: Amino Acids AndCations Detected In Saliva Of Fathers.

		Cations (ppm)			Amino acids (%)		
	pH	**Sodium**	**Potassium**	**Calcium**	**Arginine**	**Histidine**	**Tryptophan**
1	7-8	5	3	5	5	3	8
2	7-8	4	2	6	3	4	7
3	7-8	6	4	4	2	3	8
4	7-8	6	3	5	5	2	7
5	7-8	5	2	4	6	8	6
6	7-8	7	1	3	4	8	8
7	7-8	6	2	4	3	7	6
8	7-8	4	3	5	6	6	8
9	7-8	5	2	6	5	6	6
total		48	22	42	39	47	64
mean		5.33	2.44	4.66	4.33	5.22	7.11

Table 2: Amino Acids AndCations Detected In Saliva Of Children.

		Cations (ppm)			Amino acids (%)		
	pH	**Sodium**	**Potassium**	**Calcium**	**Glycine**	**Phenyl alanine**	**Tryptophan**
1	3-4	5	5	10	10	9	11
2	3-4	3	6	6	11	8	12
3	3-4	4	4	4	12	9	10
4	3-4	2	5	5	10	10	9
5	3-4	3	6	4	15	11	12
6	3-4	4	7	3	12	10	11
7	3-4	5	4	4	13	9	10
8	3-4	5	5	5	14	11	11
9	3-4	4	7	6	12	10	10
total		35	49	47	109	87	96
mean		3.88	5.44	5.22	12.11	9.66	10.66

DISCUSSION

The concentrations of total proteins in saliva are co-related with the development of the major salivary glands. The few of the abundantly seen amino acids in saliva are glycine, histidine, arginine, tryptophan, phenylalanine etc. Arginine is a non- essential amino acid which plays an important role in wound healing, cell division, immune function by increasing the size and function of thymus and hormonal secretion.[5]Histidine is a semi essential amino acid. Histidine is important for maintaining myelin sheath, which protects nerve cells, and is needed for production of both red and white blood cells.Tryptophan is an essential amino acid and is needed to maintain optimum health. It is essential for production of vitamin B, niacin, which is vital for brain to manufacture the neurotransmitter: serotonin. It enhances the release of growth factor, helps control hyperactivity, and alleviates stress. It is needed for normal growth in infants and nitrogen balance in adults.[6] Glycine is a non- essential amino acid. It is a precursor to various proteins, assists in absorbtion of calcium in body, and an inhibitory neurotransmitter. It is a part of major energy producing bio chemical processes of the body.Phenylalanine is an essential amino acid which elevates mood, aids in memory and learning. l- Phenylalanine serves as building block for various proteins that are produced in the body. It further produces tyrosine which gives rise to many different essential products like aldosterone, nor aldosterone, dopamine and hence is involved in central nervous system functioning.According to our studies, Arginine, histidine and tryptophan were the three most abundant amino acids in adult saliva samples but a few previously carried out studies suggest that glycine is the most abundant amino acid in saliva as glycine has a linear co-relation to increasing age. [7] Histidine was detected in father's saliva but could not be detected in child's salivary samples because adults generally produce adequate amounts but children may not. This is in contrast with our findings. Electrolytes are present in our body and these electrolytes are essential for the normal functioning of our cells and organs.Calcium, sodium, potassium, bicarbonates and phosphate ions are the few cations which are found in abundance in human saliva. These ions form the main buffering system and help maintain the tooth integrity.[8] Sodium is a major cation in fluids outside cells. It regulates the total amount of water in the body. The movement of sodium is essential of generation of electrical signals in our body. Potassium is also the major cation found inside cells. It regulates the transfer of nutrients to the cell, transmits electrochemical impulses and is necessary for normal growth and enzymatic reactions.[9]Calcium is important for promotion of bone health. Deficiency of calcium may lead to osteoporosis in postmenopausal women.[10] It is an important signaling molecule and it exerts regulatory responses on enzymes and proteins. It acts as second messenger in biological cycles.

It is also important in remineralization of the tooth surfaces after the acid attack. According to our study, the salivary calcium, sodium levels did not show a marked difference between both the salivary samples. The salivary potassium levels in our study were higher in children in accordance to the previous studies which also suggest higher potassium levels in mixed dentition subjects (children) than permanent dentition dentition(adults). The salivary pH is dependent on various factors like the type of food intake, oral micro flora, the time of food intake and collection of saliva etc. The salivary pH of children in our study was acidic (3-4); some studies done previously suggest that child's salivary pH is in the range of 6.9 to 7.5. This variation can be attributed to the fact that above factors were not considered in our study.

CONCLUSION

A definitive correlation could not be established between a father's and the child's saliva. The data obtained in this study is preliminary and expansion of the subjects is needed to obtain improved valid results. Further investigations with large sample size and including more parameters will help us establish whether or not there is any correlation between the salivary constituents of a father and child.

REFERENCES

1. Wu K et al. Salivary flow and compositions in children. Chang Gung Med J 2008;31:281-6
2. Sivakumar T et al. Secretory proteins in the saliva of children. Journal of Oral Science 2009;51(4):573-80
3. Chiappin S, Antonelli G, Gatti R, De Palo EF. Saliva specimen: A new laboratory tool for diagnostic and basic investigation. ClinicaChimicaActa 2007; 383:30–40
4. Saliva Collection and Handling Advice. 3rd ed. Salimetrics, LLC;2012
5. Montac M et al. The variation of some salivary components in correlation with sex and age at puberty. Timisora Med J 2003:3-4.
6. Dietary Guidelines for Americans - 2005. Washington, DC. US Dept of Health and Human Services and US Dept of Agriculture; 2005
7. Tanaka S, Machino M, Akita S, Yokote Y, Sakagami H. Changes in salivary amino acids during aging. 2010; 24:853-56
8. http://www.nlm.nih.gov/medlineplus (last accessed on 11 Sept 2013; 14:15)
9. Pednekar P, Raman B. Mulielement determination in methanolicsoxhlet leaf extract of semecarpusanacardium (Linn.F.) by ICP-AES technique. Asian J Pharm Clin Res 2013;6(3):132-7
10. Bhide R, Patil S, Shetty S, Narayanan S. Comparative bioavailability studies of calcium from different sources. Asian J Pharm Clin Res 2013;6(1):147-8