

## Evaluation of Salivary Alpha-Amylase level in Iraqi children with positive family history of hypertension

Rasha Abbas Azeez<sup>1\*</sup>, Suha Talal Abd<sup>2</sup>, Maysaa Kadhim Al-Malkey<sup>3</sup>, Sumaiah Ibraheem Hussein<sup>4</sup>

<sup>1\*,2,4</sup>Department of Basic Sciences, College of Dentistry, University of Baghdad, Baghdad-Iraq

<sup>3</sup>Tropical-Biological Research Unit, College of Science, University of Baghdad, Baghdad-Iraq

E- mail: <sup>2</sup>[suhatalal\\_abd@yahoo.com](mailto:suhatalal_abd@yahoo.com)

(Received April 08, 2021; Accepted June 22, 2021; Available online August 28, 2021)

DOI: [10.33899/edusj.2000.168651](https://doi.org/10.33899/edusj.2000.168651), © 2021, College of Education for Pure Science, University of Mosul.  
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### Abstract

This study accomplished to determine levels of salivary Alpha-Amylase (sAA) in Iraqi children with positive family history of hypertension, Hypertension was believed to be a risk factor in 18% of all deaths in 2010 (9.4 million globally). This study included one hundred children from primary school aged 6 to 13 years, with a focus in child welfare and family health history, with an emphasis on close relatives' hypertension reputations, with hypertension close relatives record categories identified by 1st and 2nd relatives, after documenting the full details, the burden was assessed for the children's families. The influence of age is confirmed by a correlation study of our own numbers, which shows a positive correlation. The disparity between age and salivary amylase level was important, with age group (12-13) years students having a higher mean salivary amylase level (309.7 U/L) than age group (6-7) years students (270.6 U/L). The gender outcome did not exceed statistical significance, but the gap was not important, which may be due to the limited sample size.

**Keyword:** Saliva و Alpha-Amylase, high blood pressure.

تقييم مستوى ألفا أميليز اللعابي في الأطفال العراقيين الذين لديهم تاريخ عائلي إيجابي لارتفاع ضغط الدم

رشا عباس عزيز<sup>1\*</sup>، سها طلال عبد<sup>2</sup>، ميساء كاظم المالكي<sup>3</sup>، سمية ابراهيم حسين<sup>4</sup>

<sup>1\*,2,4</sup> قسم العلوم الأساسية، كلية طب الأسنان، جامعة بغداد، بغداد، العراق  
<sup>3</sup> وحدة البحث الاستوائي البيولوجي، كلية العلوم، جامعة بغداد، بغداد، العراق

### الخلاصة:

أنجزت هذه الدراسة لتحديد مستويات ألفا أميليز اللعابي (sAA) في الأطفال العراقيين الذين لديهم تاريخ عائلي إيجابي لارتفاع ضغط الدم، ويعتقد أن ارتفاع ضغط الدم هو عامل خطر في 18% من جميع الوفيات في عام 2010 (9.4 مليون على مستوى العالم). تضمنت هذه الدراسة مائة طفل من المدرسة الابتدائية تتراوح أعمارهم بين 6 و 13 عامًا، مع التركيز على رعاية الطفل والتاريخ الصحي للأسرة

، مع التركيز على سمعة ارتفاع ضغط الدم لدى الأقارب المقربين ، مع تصنيفات أقارب ارتفاع ضغط الدم التي حددها الأقارب الأول والثاني ، بعد بتوثيق التفاصيل الكاملة ، تم تقييم العبء على أسر الأطفال. يتم تأكيد تأثير العمر من خلال دراسة الارتباط لأرقامنا ، والتي تظهر ارتباطاً إيجابياً. كان التفاوت بين العمر ومستوى الأميليز اللعابي مهماً ، حيث كان لدى الطلاب في الفئة العمرية (12-13) عامًا مستوى أعلى من مستوى الأميلاز اللعابي (309.7 وحدة / لتر) من طلاب الفئة العمرية (6-7) سنوات (270.6 وحدة / لتر) . لم تتجاوز نتيجة الجنس دلالة إحصائية ، لكن الفجوة لم تكن مهمة ، والتي قد تكون بسبب حجم العينة المحدود.

الكلمات المفتاحية : اللعاب ، ألفا أميليز ، ارتفاع ضغط الدم

## 1. Introduction

One of the most important enzymes produced and secreted by salivary gland cells that respond to norepinephrine. Salivary Alpha-Amylase (sAA) is a bacterial defense enzyme that catalyzes the hydrolysis reaction of starch and glycogen. Low sAA activity is linked to a higher risk of oral infection [1,2]. However, the use of sAA as a recent and effective instrument in the diagnosis of hypertension clinically and the determination of hyperactivity of sympathetic which thought to add to our understanding of the hyperadrenergic condition's functional role in hypertension. Non-pharmacological treatments are also thought to be effective or pharmacological interventions in the treatment of hypertension will open up new possibilities as a non-invasive determinant for studying sympathetic dysfunction [3, 4, and 5]. As a result, developing novel biomarkers to determine sympathetic behavior is of considerable concern in order to investigate the mechanisms of sympathetic activation from various perspectives Since saliva sampling is non-invasive, easy, and inexpensive, salivary biomarkers have piqued interest. It has been proposed that Stress-related sympathetic activity in response to psychological and physiological stimuli is reflected by the salivary enzyme alpha-amylase (sAA) [6, 1, 7 and 8]. The interested reader is pointed to Humphrey and Williamson (2001) for a detailed explanation of saliva flow and composition [9]. Regardless of the fact that several studies support sAA as a possible surrogate marker for sympathetic behavior, there's still some disagreement about its own utility, primarily whether sAA levels represent a combination of sympathetic and simultaneous parasympathetic activity instead of sympathetic activation alone [10,11]. There are two forms of elevated blood pressure: primary and secondary hypertension [12]. In 90-95 percent of cases, high blood pressure is caused by a person's diet and genetic factors [12,13]. Excess salt in the system can be affected by a number of factors, including a high-salt diet, alcohol intake, smoking, and being overweight. Secondary hypertension, which affects (5-10) % of all cases, is described as hypertension. Chronic kidney disease, endocrine abnormalities, birth control pill use, and diminished arterial renal vessels are also things to think about [12]. Blood pressure is measured using the systolic and diastolic pressures, as well as the mean and low pressures. For most adults, normal blood pressure is between 100-130 mm Hg (mm Hg) systolic and 60-80 mm Hg diastolic at rest. If your resting blood pressure is greater than 130/80 or 140/90 mmHg, you probably have elevated blood pressure [12,14]. Various numbers refer to various children[15]. Lowering blood pressure and reducing the chance of cardiovascular problems can be achieved by making lifestyle modifications and taking prescriptions. Reduced alcohol consumption, increased physical exercise, weight loss, a well-balanced diet, and lower salt intake are also examples of lifestyle changes. If lifestyle changes aren't enough Medications to lower blood pressure are used. In 90% of cases, three drugs are sufficient to keep blood pressure under control. Around 16 % and 37% of the world's population suffers from low blood pressure [16]. Hypertension was thought to be the cause of 18% of all deaths (9.4 million worldwide) in 2010[17].

Heart disease and stroke are the first and second Cardiovascular diseases (CVD) causes that leading to death in the United States [18]. Blood pressure that is elevated during childhood and adolescence is believed to be a precursor to excessive blood pressure later in life [19, 20]. Cardiovascular Disease (CVD). According to recent figures, 71 million Americans (or 35% of the population) have a kind of CVD (Congenital heart problems, as well as heart disease, stroke, heart attack, or elevated blood pressure) Total cholesterol levels of more than 200 mg/dL are seen in around 10% of adolescents aged 12 to 19, which is a significant risk factor for CVD [21]. Systolic blood pressure (SBP) and/or diastolic blood pressure (DBP) are used to characterize high blood pressure in children and teenagers (DBP) That is, the youth's age, gender, and height are all in the 95th percentile. In children and teenagers, prehypertension is described as a blood pressure reading between the (90-95) %. This has been attributed to an increased risk of hypertension.[18]

According to numerous published studies [22,23,24], Although biomarker advances, comprehensive clinical trials are needed to validate salivary biomarkers for CVD and its various clinical stages. In order to predict disease in real people over time, family history is paired in combination with the other well-known risk factors (absolute risk). Infants and persons with a positive family history of high blood pressure can exhibit early warning signs of lipid profile disturbances , high HDL cholesterol, elevated triglyceride levels, and gestational diabetes [25,26]. Research teams from the Framingham Study showed that developing CVD in at least one parent doubled the 8-year risk of CVD in men and boosted the risk of CVD in women by 70%. [27, 28]. Although family history has been shown to play a role in the risk of diabetes and cardiovascular disease, it is now commonly used to calculate that risk quantitatively. When it is, family history is commonly used to rank subgroups within a population based on one group's higher prevalence than another (relative risk) [29, 30]. This study aimed to investigate the correlations of sAA (Salivary Alpha-Amylase) levels of hypertension in Iraqi positive family history children. The presence of symptoms Since the system has had only a short time to function, the presence of adult chronic diseases in children means that genetic factors are significant.

### **Research Method**

This study included one hundred children from primary school aged 6 to 13 years , with a focus in child welfare. and family health history, with an emphasis on close relatives' hypertension reputations, with hypertension close relatives record categories identified by 1st and 2nd relatives. A standardized questionnaire was circulated in Arabic language and sent to close relatives' representatives of each student, child health history and family health background, focusing on close relatives' credibility of hypertension, with hypertension close relatives record categories identified by 1st and second relative's, the strain was assessed for the children's families after documenting all of the data. Using disposable plane dental mirrors and probes, a clinical oral test was performed under natural light. According to Loe (1967),[31], gingival health status was calculated by the gingival index (GI). The bleeding is assessed by probing gently along the wall of soft tissue of the gingival sulcus. The scores of the four areas of the tooth can be summed and divided by four to give the GI for the tooth. The GI of the individual can be obtained by adding the values of each tooth and dividing by the number of teeth examined. The Gingival Index may be scored for all surfaces of all or selected teeth or for selected areas of all or selected teeth. The GI may be used for the assessment of prevalence and severity of gingivitis in populations, groups and individuals. A score from 0.1-1.0 = mild inflammation; 1.1-2.0 = moderate inflammation from, and 2.1-3.0 signifies severe inflammation. The GI has been used frequently in clinical trials of therapeutic agents The sensitivity and reproducibility is good provided the examiner's knowledge of periodontal biology and pathology is optimal (Loe, 1967). Saliva was collected from both members under the same circumstances after a

therapeutic oral review. The strain was assessed for the children's families after documenting all of the data. Using disposable plane dental mirrors and probes, a clinical oral test was performed under natural light. According to Le (1967) [31]. Saliva was collected from both members under the same circumstances after a therapeutic oral review. Salivary flow rate was measured in milliliters per second after the salivary froth had disappeared. Before they were checked, the samples were held at -80°C. The sampling sessions were limited to the hours of 9:00 and 11:00 a.m. to minimize the influence of diurnal variations. The concentration of salivary amylase was calculated using Saliva Analysis Quantitative Colorimetric Amylase Dedication at 585nm. Bio-assay Systems' Enzy Chrom TM-Amylase Analysis Kit (ECAM-100) (USA).

SPSS version 19.0 was used for the statistical analysis (SPSS Inc; Chicago, IL, USA). The following methods were used: descriptive statistical analysis, study of variation (ANOVA), student T-test, and straight line and several straight-line connections. Mathematical significance was defined as a p-value of less than 0.05.

### **Blood pressure assessment**

The participants' systolic and diastolic blood pressures were measured in their left arm as they sat upright. The general practitioner assessed the patient using the procedure of Riva-Rocci (Boso sphygmomanometer, Germany). Real standards (World Health Organization-International Society of Hypertension). Hypertension Management Guidelines are a set of recommendations for treating hypertension. Participants were graded as hypertensive whether their systolic BP was 140 mmHg or their diastolic BP was 90 mmHg (Guidelines Subcommittee, 1999).

### **Results**

**Table (1): Salivary Alpha- Amylase levels in children with mild and moderate gingival index**

Gingival index	Salivary Amylase U/L				
	Mean	SD	SE	N	P
Mild (0.1 -1)	281.9	41.3	6.5	40	0.22[NS]
Moderate (1.1-2)	291.1	36.5	4.3	73	

The difference in mean salivary amylase levels between children with mild (0.1 -1) gingivitis (281.9 ± 41.3) and those with higher gingival indexes was not significant, as seen in table 1. The gingival index in this study was divided into two categories: mild and severe, and the majority of sample participants falling into the moderate score range (291.1± 36.5), though the mean variations were not significant with the P value (0.22).

**Table (2): Salivary Alpha- Amylase level according to age group of children**

Age group (years)	Salivary Amylase U/L				
	Mean	SD	SE	N	P
6-7	270.6	41.0	7.6	29	<0.001
8-9	281.2	35.9	6.1	35	
10-11	300.6	34.1	5.8	34	
12-13	309.7	27.4	7.1	15	

The sample's key characteristics are shown in Table 2. There are four classes, for both sexes, according to the factorial configuration (current blood pressure level [high vs. low]) The control group has a high blood pressure and is not taking any antihypertensive drugs (AD). The influence of age is confirmed by a correlation study of our own results, which shows a positive correlation between age and salivary Amylase Level. The table also revealed that students in the age group (12-13) years had a significantly higher mean salivary amylase level (309.7 U/L) than students in the age group (6-7) years (270.6 U/L). The gender outcome did not exceed statistical significance, but the gap was not important, which may be due to the limited sample size.

**Table (3): Family history of high Blood Pressure and Salivary Alpha- Amylase Level.**

Family history (Hypertension)	Salivary Amylase U/L				
	Mean	SD	SE	N	P
Negative	272.0	57.8	12.9	20	0.08[NS]
Positive first degree	297.7	37.4	7.8	23	
Positive second degree	288.9	30.0	3.6	71	

Children with a positive family history of elevated blood pressure have a higher salivary amylase level than people with a poor family history (297.7) U/L vs.( 272.0)U/L, according to the findings of table of (3).

**Table (4): Multiple linear regression model with salivary Amylase concentration was used as the dependent variable, along with a number of explanatory variables.**

	partial regression coefficient	P	Standardized regression coefficient
(Constant)	224.534	< 0.001	
Gingival index	36.541	0.19[NS]	.128
Age	5.180	0.02	.273
Gender	-10.644	0.15[NS]	-.137
Family history (Hypertension)	-9.262	0.22[NS]	-.117

**R<sup>2</sup>=0.205 P (Model) =0.005**

The explanatory variables are gingival index, age, and gender, as seen in table (4). After correcting for the other explanatory variables in the model, only age displayed The level of salivary alpha- amylase has a statistically important positive correlation. Per year of age, the Salivary alpha- amylase level is expected to increase by an average of 5.2 units.

### Discussion

Since the climate has only had a limited period to function, the presence of symptoms which denote presence of adult chronic diseases in children means that genetic conditions play a role. Environmental factors are also at hand, as shown by the recent rapid decrease in diet and physical activity patterns. At the conclusion of the report, total cholesterol levels, SBP and DBP, and BMI did not differ significantly between those in the intervention or control schools., according to a study undertaken by Nader PR, et al 1999; Webber LS 1996 [32,33].

The Dietary Intervention Study in Children was a randomized controlled trial that took place outside of school, LDL-cholesterol levels in children aged 8 to 10 years old were elevated that studied in a randomized controlled trial [34]. Elevated blood pressure during infancy and puberty is thought to be an indicator of high blood pressure later in life[19,20] .

For the youth's age, gender, and height, a systolic blood pressure (SBP) and/or diastolic blood pressure (DBP) at or above the 95th percentile is considered high blood pressure in children and adolescents. (i.e., a blood pressure that is slightly higher than average but not high enough to be classified as hypertension); this is linked to an elevated chance of experiencing hypertension[18 ]

Adults can lower their risk of premature mortality and events by reducing or treating heart disease and stroke risk factors. For instance, studies conducted in Veterans Administration hospitals Treatment for high blood pressure resulted in fewer cases of stroke, heart disease, and worsening hypertension in the 1960s [35, 36]. Over a four-year duration, a reduction in SBP of 12 to 13 mm Hg was associated with a 21% reduction in CHD, a 37% reduction in stroke, a 25% reduction in total cardiovascular mortality, and a 13% reduction in all-cause mortality[37]. According to some research, a 10% reduction in serum cholesterol concentrations reduces the risk of heart attacks by 30% [38]. Diet, cigarette consumption, physical exercise, family history, height, weight, and blood pressure are all assessed by the American Heart Association. Obesity, asthma, dyslipidemia, diabetes, and early CVD (onset age for men 55 years and 65 years for women) can all be considered in the presence of first-degree kin. Family history should be taken into account before screening and treating children for high cholesterol and other risk factors [39,40,41]. The US Preventive Services Task Force found that routine screening for elevated blood pressure or obesity in children and teenagers would decrease their risk of cardiovascular disease.

## **Conclusion**

There was a positive correlation between age of children with positive family history of high blood pressure and salivary amylase level, while there was no correlation of between gender and salivary amylase level for the same children.

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