

## Gingival Health Condition In Relation To Salivary Alkaline Phosphatase And Secretor Status AB Blood Type Among A Group Of Primary School Children.

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### Abstract:

**Background:** Some researches were done for adult patients concerning the gingival health and its relation to alkaline phosphatase (AIP) level in saliva among different blood groups; others were done concerning the gingival health and its relation to (AIP) level in intestinal fluid or in gingival crevicular fluid (GCF) in pediatric patients. So this study was conducted among primary school children aged 6-8 years in order to find the salivary secretor status of AB blood group in relation to gingival health condition expressed by plaque index and gingival index on one hand, and the salivary alkaline phosphatase related to gingival health on the other hand.

**Materials and Methods:** The sample included 99 school children aged 6-8 years (56 boys, 43 girls). gingival health condition was inspected by plaque index (PII) reported by Silness and Loe, 1964 and gingival index (GI) reported by Loe and Silness, 1963. Unstimulated salivary samples were taken following the criteria suggested by Fejerskov and Thylstrup, 1994. Agglutination inhibition was utilized for secretor status and the laboratory analysis for salivary (AIP) was determined spectrophotometrically according to the recommendation of the German Clinical Chemistry Association using the kit of Human Company. Statistical analysis performed using SPSS version 20.

**Results:** The non-secretor children were with higher mean GI, mild and moderate gingivitis than secretors with non-significant difference. The mean PII was higher in secretors than non-secretors, also with non-significant difference. Salivary AIP was higher in non-secretor children than secretors, with statistically non-significant difference. All the relations between the gingival health condition, represented by GI and PII, and the salivary AIP between secretor and non-secretor groups were non-significant.

**Keywords:** ABO, Saliva, Children, AIP.

### I. Introduction

Alkaline Phosphatase is one of the intracellular enzymes present especially in bone and increasingly released from the damaged cells of periodontal tissues into the gingival crevicular fluid and saliva, as well as in the surrounding fluids. However, if a periodontal tissue becomes sick, or its cells become damaged, these intracellular enzymes are increasingly being released into the gingival crevicular fluid and saliva where their activity can be measured. Some researchers found an increase of salivary AIP in disease or abnormal conditions<sup>(1,2)</sup> such as liver diseases, congestive heart failure, diabetes, infections, and in diseases which impair kidney functions<sup>(3,4)</sup>. Due to this, these enzymes can be biochemical markers of the functional condition of periodontal tissues<sup>(5-10)</sup>.

It was reported that there is positive correlation between the activity of AIP and value of the gingival inflammation, and highly significant rise in activity AIP levels in gingivitis<sup>(11-15)</sup>. On the other hand some researchers found there was no significant relationship between total GCF AIP and plaque levels<sup>(16)</sup>, and it was determined the positive correlation between the remarkably increased activity of AIP and the periodontal disease<sup>(7,9,11,17-22)</sup>. However; after proper periodontal treatment the level of AIP returns to normal as proved by many studies<sup>(11,12,14,21,23-24)</sup> and decrease in the salivary levels of AIP would indicate lower alveolar bone destruction<sup>(24,25)</sup>. It was noted that almost no relationship existed between age of subjects and activity of their salivary AIP<sup>(26)</sup>.

ABO system discovered in 1900 by Karl Landsteiner and remains the most important of the blood type, defined by the presence or absence of antigens on RBCs and antibodies in plasma<sup>(27-28)</sup>. Many studies are suggestive of a correlation between periodontal diseases and blood types, which may act as risk predictors for periodontal diseases<sup>(29-33)</sup>.

The mean GI among student with type AB was significantly higher than students with type B and type A, in addition students with type O had significantly higher mean GI than students with type A. The mean PII was highest among students with AB type and the lower among students with type A; however the differences were not significant.<sup>(34)</sup>

The relation between secretor status and the activity of serum AIP was determined by many studies as they found that strong association as the non-secretor had lower level than secretor of ABO blood type<sup>(35-38)</sup>. On the other hand some studies found that intestinal AIP was greater in subjects without blood antigen A (B and O) than in those with antigen (A and AB)<sup>(39-42)</sup>.

While Kadhum RF found the mean salivary concentration of AIP was significantly higher among students with type AB than type A (mean difference=0.94, P value=0.00) and type B (mean difference=1.00, P value = 0.00) as well as type O (mean difference=0.56, P-value =0.32). Non-significant relation of salivary alkaline phosphatase with oral hygiene measured by PII and the gingival health condition measured by GI among students with different blood type was emphasized<sup>(34)</sup>.

## **II. Aims Of The Study**

This study was conducted among primary school children aged 6-8 years in order to find the salivary secretor status of AB blood group in relation to:

1. Gingival health condition expressed by PII and GI.
2. Salivary alkaline phosphatase related to gingival health.

## **III. Materials And Methods**

The sample of the present study included ninety-nine children aged 6-8 years (56 boys, 43 girls) who were selected randomly from school. Gingival health condition was inspected by plaque index (PII) reported by Silness and Løe, 1964<sup>(43)</sup>, gingival index (GI) reported by Løe and Sillness, 1963<sup>(44)</sup>. Salivary sample (unstimulated) was taken from the children following the criteria suggested by Fejerskov and Thylstrup, 1994:

- “1. The patient should not eat or drink (except water) one hour before saliva collection.
2. A pre – sampling period of one minute is recommended.
3. A fixed collection time (10-15 min. for unstimulated saliva) should be used.
4. The patient should sit in a relaxed position in an ordinary chair.
5. Samples containing blood should be discarded if chemical analyses of saliva are planned.”<sup>(45)</sup>

To determine if a student's is salivary secretor for AB blood type the principles of agglutination inhibition was utilized where the presence of agglutination means a negative test and no agglutination is positive result.

The laboratory analysis for salivary alkaline phosphatase was determined spectrophotometrically according to the recommendation of the German Clinical Chemistry Association using the kit of Human Company, Germany.<sup>(46)</sup> Statistical analysis was performed using SPSS version 20.

## **IV. Results**

Descriptive statistics of the sample which was constituted of 99 children (56 boys, 43 girls), the non-secretors (62.62%) were more than the secretors (37.37%) (Table 1).

Table 2 demonstrates the GI among boys and girls according to the secretor status, the girls were with higher GI than boys in secretor group, while the opposite result was found for the non-secretors (boys had higher GI than girls), however; the difference was non-significant in both cases. Concerning the GI according to secretor status regardless the gender difference, the non-secretors were with higher mean GI, however; the difference was non-significant.

According to severity of GI, there was only one non-secretor girl with healthy gingiva, there were more non-secretor boys (32.65%) than girls (22.45%) having GI 0.1-1 (mild gingivitis). On the other hand the opposite result was found concerning the moderate gingivitis.

According to secretor status regardless the gender difference, the non-secretor children with mild and moderate gingivitis were more than secretors (table 3).

The mean PII was higher in secretors than non-secretor children although the difference was non-significant. The same result was found when testing the secretor girls with non-secretor girls, while the non-secretor boys were with higher PII than secretors with non-significant difference (table 4).

Table 5 demonstrates the salivary AIP according to secretor status by gender. Girls were higher salivary AIP activity than boys in both secretor and non-secretor groups, however; the difference was statistically non-significant. The level of AIP regardless the gender difference was higher in non-secretor children with non-significant difference.

There were a negative non-significant relation between salivary AIP to the GI in both groups; secretor and non-secretor children (table 6). About the relation between the salivary alkaline phosphatase and the PII, there was a positive non-significant relation in secretor group, while a negative non-significant relation in non-secretor group is estimated (table 7).

## V. Discussion

There may be no previous Iraqi study pointing the light on the gingival health condition among secretor and non-secretor children, so this study is considered as a baseline data for future comparison. The non-secretor children constitute (62.62%) from the total sample, in which they were more than the secretors (37.37%). The non-secretor children were with higher mean GI, mild and moderate gingivitis than secretor children, however; the difference was non-significant. This result is not in accordance with previous studies<sup>(29-33)</sup> which may be interpreted by the presence of the blood group (O) with the non-secretor group.

The mean PII was higher in secretors than non-secretors, but the difference was non-significant, which is the same result found by Kadhun RF, 2015. Secretion of ABO into saliva may interfere with the attachment of bacteria into the tooth surface, surface lectins of bacteria, which help them to attach the tooth surface, is ABO specific. Also the secretion of ABO in saliva makes the media more diverse and with more carbohydrates than non-secretors<sup>(47-53,32)</sup>.

Salivary AIP was higher in non-secretor children than secretors, however; with statistically non-significant difference. This result disagrees with previous studies that concern the intestinal AIP rather than salivary AIP<sup>(35-38)</sup>. About the relation between the gingival health condition (represented by GI and PII) and the salivary AIP between secretor and non-secretor children, all the relations were non-significant which agrees with previous study estimated for adult patients<sup>(34)</sup>.

It can be concluded from this study that there is a higher level of mild to moderate type of gingival inflammation and plaque accumulation among secretors than non-secretors, and there is a non-significant relation between the salivary alkaline phosphatase and the gingival inflammation with its plaque accumulation among secretor and non-secretor children.

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Table 1 distribution of the children according to the secretor status

Gender	AB secretor status				Total
	Secretor AB		Non-secretor		
	No	%	No	%	
b o y	18	18.18	56	38.38	56
g i r l	19	19.19	43	24.24	43
t o t a l	37	37.37	99	62.62	99

Table 2 gingival index according to secretor status

Gender	A B secretor status						T-test	sig
	Secretor AB			Non-secretor				
	No	mean	±SD	No	mean	±SD		
boys	18	0.76	0.62	38	0.90	0.36	1.47	0.15
Girls	19	0.93	0.21	24	0.84	0.26	-1.16	0.25
Total	37	0.84	0.25	62	0.87	0.32	0.50	0.62

Table 3 distribution of children according to severity of gingival index by secretor status

Severity of gingivitis	gender	Secretor AB		Non-secretor	
		no	%	no	%
0 . 1 - 1	B o y s	17	17.35	32	32.65
	G i r l s	16	16.33	22	22.45
	t o t a l	33	33.67	54	55.1
1 . 1 - 2	B o y s	1	1.02	6	6.12
	G i r l s	3	3.06	1	1.02
	t o t a l	4	4.08	7	7.14

Table 4 plaque index according to secretor status

Gender	A B secretor status						T-test	sig
	Secretor AB			Non-secretor				
	No	mean	±SD	No	mean	±SD		
B o y	18	1.54	0.52	38	1.61	0.55	0.44	0.67
G i r l	19	1.75	0.52	24	1.52	0.56	-1.36	0.18
Total	37	1.65	0.53	62	1.57	0.55	-0.65	0.52

Table 5 Salivary alkaline phosphatase according to secretor status by gender

Gender	A B secretor status						t-test	sig
	Secretor AB			Non-secretor				
	No	mean	±SD	No	mean	±SD		
B o y s	18	0.80	1.18	36	1.07	1.74	0.58	0.57
G i r l s	17	1.20	1.3	21	1.30	1.71	0.20	0.84
t o t a l	35	1.00	1.24	57	1.15	1.72	0.47	0.64

Table 6 Salivary alkaline phosphatase in relation to gingival index according to secretor status

	No	r	P
Secretor AB	35	-0.04	0.83
Non-secretor	57	-0.18	0.18

Table 7 Salivary alkaline phosphatase in relation to plaque index according to secretor status

	No	r	P
Secretor AB	35	0.12	0.51
Non-secretor	57	-0.25	0.06