

Effect of benzene fuel on IgE, SIgA, Alpha amylase for workers in filling stations in Basrah, Iraq

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ABSTRACT

Background & objectives: Study aimed to determine the effect of benzene fuel on the immunity of workers in filling stations by estimating the level of immunological parameters (IgE, SIgA, Alpha amylase).

Method: Seventy samples were collected from gas station workers and twenty saliva samples were collected from neither workers nor lives near gas fumes. The collection period of the saliva began from September and ended in November 2019. Samples were collected at 3 ml in 50 ml tubes.

Result: Results showed that the level of T. IgE >3 was the highest amongst the gas station filling workers at rate 31.42% compared with those who don't work at gas stations with a significant difference at probability level $p \leq 0.05$, but the result showed that of T. IgE <3 was the highest at rate 68.58% compared with workers. Also, this study showed decreased total IgE in 3rd age group at rate 43%, while increase total IgE in 1st age group with significant difference compared with other age groups. As well as study showed that level of T. IgA increase in 1st group at rate 28.58% compared with 2nd group with a significant difference at probability level $P \leq 0.05$. Furthermore, the results showed that T. IgA increase in 2nd age group (40-31) year at rate 43%, and decreased total IgA in 4th age group (41-50) year at rate 80% with a significant difference at probability level $P \leq 0.05$ compared with other age groups. As well as the study showed the level of α Amylase level in the saliva of gas station employees it was observed that increase at rate 81.43% comparison of the control samples with a significant difference at probability level $P \leq 0.05$. Also, current study showed α Amylase > 1000 in the saliva of gas station employees in the age group 18-30 years at rate 86%, while the α Amylase > 1000 was higher in the age group (31-40) at rate 28% with a significant difference at probability level $P \leq 0.05$. Study showed that an increase in α Amylase > 1000 at rate (81.4%) in comparison of the other immunological norms with a significant difference $P \leq 0.05$. Observed that an increase in the level of IgE, α Amylase accompanies the decrease of T. IgA. We in comparison of controlled samples. **Conclusion** benzene fuel affects the immune system of workers at filling stations. For that we think this is the reason for the increased severity of allergies, as well as the inability to fight bacterial infection.

Keywords: benzene, fuel, IgE, SIgA, Alpha amylase.

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I. INTRODUCTION

Air pollution is a major problem in recent decades, which has an impact on human health as it negatively affects the respiratory system for humans and other living organisms [1,2]. In the past, genetic internal factors were the primary and direct responsibility for human health, but with industrial and technological development accompanied by environmental pollution, today the external environmental factors are the direct and first responsible reasons for human health. environmental imbalance occur because various sources, as use of machines and other activities such as gas stations [3,4]. Activities at gas stations are the most common results of air pollution, as volatile hydrocarbon compounds that constitutes fuel ,are harmful to station employees, customers and neighbors that live near the stations where fuel from vehicles fly during the filling of fuel tanks by other tanks or during the mobilization of vehicles from pumps. These materials can also fly in the event of fuel spills during this time [5].When enter this foreign bodies into body lead to many syptoms such as mucous secretions, skin infections, sensitivity, hard breathing, coughing. Cough, damage of membranes, hormonal implants, endocrine disorders and other diseases. Mucous membranes this in the gastro-intestinal tract, the Urogenital system, the mouth cavity and the respiratory system, are protected by a network of organized structures known as the Common Mucosal Immune System [6] .Patches of Peyer and Lymphocytes in the intestine-related lymphoid tissue and trachea lymphoid tissue and salivary glands.The production of (IgA), especially (SIgA), is the main influencing function of the mucosal immune system, (SIgA) with innate mucosal defenses such as α amylase, lactoferrin, lysozyme. For pathogens on the mucous surfaces [6]. It has been found that combined exposure to diesel emissions and airborne allergens increases IgE levels, asthma severity and airway inflammation [7]. This study aimed to determined the effect benzene fule fumes on workers at at filling stations

II. METHODOLOGY OF RESEARCH

Collection Saliva samples

Seventy samples were collected from the gas station workers of the Basrah province, in southern Iraq.Also twenty saliva sample were collected from neither works nor lives near gas fumes. The collection period of the saliva began from September and ended in November 2019. Samples were collected at 3 ml in 50 ml tubes.

Samples

Inactive saliva was collected between 10 am to noon (12pm) and more than ,each sample was distributed in a 100 micro-liter Eppendorf for testing purposes . the samples were placed in centrifuge for one minute at 10,000 rpm for ELISA testing.

Determine IgE, SIgA, S Alpha Amylase

The manufacturer's steps using ELISA device which was manufactured by GENEX Laboratories. (Florida –USA) was used to measure the concentration of each of the following immunological parameters for both the workers and non-workers group, (IgE, SIgA, S Alpha Amylase) and wavelength of 450 nm depending on the manufacturer.

III. RESULTS

The results In Table (1) showed that the level of T. IgE >3 was the highest amongst the gas station filling workers at rate 31.42 % compared with of those who don't work at gas stations with a significant difference at probability level $p \leq 0.05$, but when compared workers at gas stations between them, the result showed that of T. IgE <3 was the highest at rate 68.58 %.also this study showed in table 2 decreased concentration of total IgE in 3rd age group at rate 43% ,while increase total IgE in 1st age group with significant different compared with other ages groups . as well as study showed in table 3 that level of T. IgA increase in 1st group at rate 28.58% compared with 2nd group (don't work in gas stations) with a significant difference at probability level $P \leq 0.05$. futhermore ,the results showed in table 4 that T. IgA increase in 2 nd age group (40-31) year at rate 43% ,and decreased concentration of total IgA in 4th age group (41-50)year at rate 80% with a significant difference at probability level $P \leq 0.05$ compared with other ages groups .as well as the study showed in Table (5) the size of concentration of the level of α Amylase level in the saliva of gas station employees it was observed that increase of concentration of the enzyme by 81.43% if α Amylase > 1000 in comparison of the control samples with a significant difference at probability level $P \leq 0.05$. also current research showed in Table (6), that the concentration of α Amylase > 1000 in the saliva of gas station employees in the age ranges between 18-30 years with the percentage 86%, while the concentration of α Amylase >1000 was higher in the age ranges between (31-40) with a percentage of 28%, with a significant difference at probability level $P \leq 0.05$. In Table (7) study showed that an increase in a α Amylase > 1000 at rate (81.4%) in comparison of the other immunological norms with a significant difference $P \leq 0.05$ as well was observed that an increase in the level of IgE or α Amylase accompanies the decrease of T. IgA We in comparison of controlled samples.

Table No. (1): The percentage concentration of **IgE** in saliva samples

Total IgE U/cm3	1st group		2nd group	
	N.	%	N.	%
T. IgE <3	48	68.58	19	95
T. IgE >3	22	31.42	1	5
Total	70	100	20	100

Table No. (2): The percentage level of **IgE** in saliva samples of the filling station workers (1st group) according to different age categories

Age collections	No. of samples	IgE>3		IgE<3	
		N.	%	N.	%
18- 30	43	12	28	31	72

31- 40	7	3	43	4	57
41 -50	20	8	40	12	60
Total	70				

Table No. (3): The percentage concentration of **IgA** in saliva samples

T. IgA g/ml μ	1st group		2nd group (control)	
	N.	%	N.	%
T. IgA <3	50	71.42	11	55
T. IgA >3	20	28.58	9	45
Total	70	100	20	100

Table No.(4): The percentage level of **IgA** in saliva samples of the filling station workers (1st group) according to different age categories

Age collections	No. of samples	IgA>3		IgA<3	
		N.	%	N.	%
18- 30	43	13	30	30	70
31- 40	7	3	43	4	57
41 -50	20	4	20	16	80
Total	70				

Table No. (5): The percentage concentration of **α Amylase** in saliva

α Amylase U/L	1st group		2nd group (control)	
	N.	%	N.	%
α Amylase < 1000	13	18.57	5	25

α Amylase > 1000	57	81.43	15	75
Total	70	100	20	100

Table (6): The percentage level of α Amylase in saliva samples of the filling station workers according to different age categories

Age collections	No. of samples	α Amylase >1000		α Amylase <1000	
		N.	%	N.	%
18- 30	43	37	86	6	14
31- 40	7	5	72	2	28
41 -50	20	16	80	4	20
Total	70				

Table (7): The amount of immunological criteria levels (**IgE, IgA, and α Amylase**) in the filling station workers saliva samples

Considered samples	No. of samples	T. IgE >3 U/cm3		T. IgA >3 U/cm3		α Amylase > 1000 U/cm3	
		N.	%	N.	%	N.	%
1st group (The workers)	70	22	31.4	20	28.5	57	81.4
2nd group (The control)	20	1	5	9	45%	15	75
Total	90						

IV. DISCUSSION

This study is assumed to be unique in the use of saliva samples to measure immunological criteria in order to study the effect of direct exposure to gasoline fumes on those immunological criteria, and to know the extent of the impact on both types of humeral and cellular immunity, with a comparison between the people who

are exposed to these fumes and the others who are far from it (the control). The results showed that the level of T. IgE >3 was the highest amongst the gas station filling workers at rate 31.42 % compared with those who don't work at gas stations, but when compared workers at gas stations between them, the result showed that of T. IgE <3 was the highest at rate 68.58 %. Also this study showed decreased concentration of total IgE in 3rd age group at rate 43%, while increase total IgE in 1st age group with significant difference compared with other ages groups. The long-term exposure to gasoline fumes for workers at filling stations has serious health effects, as the current study showed that the proportion of immune protein associated with IgE allergies among workers was high as a result of chronic inhalation of workers and this is consistent with the findings of Abdel Maksoud *et al* [8]. It has been observed that the age has a significant effect on the level of immunological criteria in the human body, as it was found that the lower IgE in the age collection of the range 18-30 years was higher than that of the age collection of the range 31-50 years, which indicates that the strength immunity increases in the younger age categories and decreases in the older ages, which agree with Fuentes *et al.*[9] and Jafarzadeh *et al.*[10]. Mucous surfaces that include the respiratory, digestive and urogenital systems are the most important entry gates for pathogens, especially bacteria and viruses. During respiration, the airways are subjected to direct confrontation through the massive content of airborne microorganisms and environmental antigens. Therefore, the mucous surfaces in the airway must use strong, unspecified and specific mechanisms to protect against respiratory infections, as well as study showed that level of T. IgA increase in 1st group at rate 28.58% compared with 2nd group (don't work in gas stations) with a significant difference at probability level $P \leq 0.05$. Furthermore, the results showed in table 4 that T. IgA increase in 2nd age group (40-50) year at rate 43%, and decreased concentration of total IgA in 4th age group (41-50) year at rate 80% with a significant difference at probability level $P \leq 0.05$ compared with other ages groups. The lower IgA immune ratio was higher in the workers (1st group) compared to the control group, as a result of the suppression of the cells that produced this protein, which agree with Abdel Maksoud, *et al* [8]. Many study on total IgA and associated with disease such study by [11] as well as the study showed concentration of the level of α Amylase level in the saliva of gas station employees it was observed that increase of concentration of the enzyme by 81.43% if α Amylase > 1000 in comparison of the control samples with a significant difference at probability level $P \leq 0.05$. Also study showed that the concentration of α Amylase > 1000 in age group (18-30) years at rate 86%, while the concentration of α Amylase > 1000 was higher in the age group (31-40) at rate 28%, with a significant difference at probability level $P \leq 0.05$. Also this study showed that an increase in a α Amylase > 1000 at rate (81.4%) in comparison of the other immunological norms with a significant difference ($P \leq 0.05$). The ratio of concentrations of α amylase in the workers was high as a result of bacterial infections due to weak cellular immunity of the workers and their increased exerted effort. As well was observed that an increase in the level of IgE or α Amylase accompanies the decrease of T. IgA. We in comparison of controlled samples. This phenomenon may be due to the aging which leads to less salivary secretions. Likewise, the lower IgA decreased in the younger age (18-30 years) collection while it is increased in the older age (41-50 years) which agree with (10). It has been found also, that the level of amylase α is greater among the younger age collection (18-30 years) while it has been decreased in the older ages, this is may be due to the declining of immunity with age the study by Kelly [12] showed Impact Pollutants on asthma disease.

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