



## SERUM LIPID PROFILE AND LEPTIN LEVELS IN ASTHMATIC LIBYAN CHILDREN

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### ABSTRACT

*Aim:* To study lipid profile and leptin levels in non-obese Libyan children with asthma. *Materials and Methods:* 70 Libyan children from Pediatrics Department, Faculty of Medicine, Benghazi University, Benghazi, Libya were included for the present study (from 2013 to 2014). Group I formed the normal control group (N: 30 Children) and Group II is 40 Libyan children with asthma. Their age group varied from 4 to 12 years old. Serum lipid profile and leptin were measured by routine standard methods. *Results and discussion:* The Libyan children with asthma showed an increase in serum total cholesterol, LDL cholesterol, VLDL cholesterol, HDL cholesterol and triglycerides. Serum Leptin levels did not show marked changes between the two groups. The presence of hypercholesterolemia could be a triggering factor for generation of proinflammatory response in these children. Though leptin levels did not show marked response further studies may be necessary to study the role of leptin in obese asthmatic Libyan children.

**Keywords:** Asthma, Lipid profile, Leptin, Proinflammatory response, Libyan children.

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### Contribution/ Originality

This paper tries to bring out the relationship between serum leptin and lipid levels in non-obese asthmatic Libyan children and relate it to serum leptin level.

### 1. INTRODUCTION

Hypercholesterolemia is shown to be responsible for the development and precipitation of atherosclerosis and coronary artery disease (CAD) [1]. But its association with active immunity and asthma have been studied with conflicting results [2-4]. Very few studies are available regarding lipid profile in asthmatic children [5]. The presence of childhood obesity and asthma in Benghazi in Libyan children prompted us to carry out this studies to evaluate lipid profile in normal and non-obese asthmatic children.

### 2. MATERIALS AND METHODS

70 Libyan children attending Pediatrics Department, Faculty of Medicine, Benghazi University, and Benghazi, Libya were included for the present study (from 2013 to 2014). 30 Children in Group I (normal control) and 40 children group (asthma) II formed the study groups.

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The inclusion criteria used are: children below the age group 12 years (4 to 12 years old), with no associated disorders including acute infection, free from other medications, excepting anti-asthmatics. Informed consent was taken from the cases taken for the study and approval for the study was obtained from Institute's Ethics Review Board. Body Mass index (BMI), serum total cholesterol, HDL cholesterol, triglycerides, VLDL cholesterol were measured using standard methods. LDL cholesterol was calculated using Fried Wald formula.

### 2.1. Statistical Analysis

Data were analyzed using statistical package (SPSS Version17). The results were presented as (mean  $\pm$  SD). Data comparisons were performed using two tailed unpaired Student t-test, and correlation coefficient was used for correlations. A value of  $p < 0.05$  was considered to be significant

## 3. RESULTS

### 3.1. Comparisons of Normal Children and Non-Obese Asthmatic Children Regarding Biochemical Analyses Serum Total Cholesterol Concentration (TC) (mg/dL)

The serum concentration of cholesterol level in the non-obese asthmatic children was higher than normal children respectively ( $P < 0.001$ ;  $125.89 \pm 28.084, 152.26 \pm 30.09$ , respectively) see Table.1 and Fig.1 and 2. A significant positive correlation was found between serum TC concentration and LDL cholesterol ( $P < 0.01$ ) and triglyceride(TG)( $P < 0.05$ ). No significant correlation between serum cholesterol and HDL, VLDL and Leptin was observed ( $P > 0.05$ ) (Table 2 and 3).

### 3.2. HDL-Cholesterol (mg/dL)

The HDL-Cholesterol for normal children was  $39.09 \pm 9.09$  and non-obese asthmatic children was  $48.74 \pm 11.20$  respectively. The HDL cholesterol was higher in non-obese asthmatic children compared to the control subjects. ( $P < 0.001$ ) see Table (1) No significant correlation was observed between serum HDL-C and TC, VLDL, TG, and leptin. (Table.3 and 4) A significant positive correlation was found between serum HDL-C concentration and LDL ( $P < 0.05$ ).

### 3.3. LDL-Cholesterol (mg/dL)

Serum LDL-Cholesterol for normal children was  $64.53 \pm 29.54$  and non-obese asthmatic children  $80.97 \pm 32.79$ , respectively. There was a significant increase in LDL-cholesterol in asthmatic children compared to normal controls. (Table.1 and 2)

A significant positive correlation between serum LDL-C and serum cholesterol ( $P < 0.01$ ) was observed. There was no significant correlation between serum LDL-C HDL, VLDL, TG and leptin levels ( Table.3).

### 3.4. VLDL-Cholesterol (mg/dL)

The serum VLDL-cholesterol for normal children was  $20.88 \pm 6.61$  and in non-obese asthmatic children  $25.64 \pm 21.00$ , respectively. A significantly positive correlation between serum VLDL-cholesterol and serum Triglycerides was observed ( $P < 0.01$ ).

### 3.5. Serum Triglyceride (mg/dL)

The serum triglyceride in normal children was ( $109.91 \pm 35.94$ ) and non-obese asthmatic children was ( $112.54 \pm 36.81$ ) respectively. A significant positive correlation between serum TG and serum VLDL ( $P < 0.01$ ) was seen in normal children only and not in asthmatic children.

Table-1. Serum Lipid profile and Leptin in non-obese asthmatic Libyan children

	Normal Children(N:30)		Non-obese asthmatic children(N:40)		P Value
	Mean	SD	Mean	SD	
Total Cholesterol(mg/dL)	125.89	28.08	152.26	30.09	0.00*
LDL-cholesterol(mg/dL)	64.53	29.57	80.97	32.80	0.03
VLDL-cholesterol (mg/dL)	20.88	06.62	25.60	07.75	0.24
HDL-cholesterol(mg/dL)	39.10	09.10	48.70	11.20	0.00
Leptin(ng/ml)	02.44	01.63	02.62	01.63	0.64

Source: Libyan children, Department of Pediatrics, Faculty of Medicine, Benghazi University, Benghazi

Number of sample N=70; P Values shown only if statistically significant. 0.05 significant, < \*P 0.01 highly significant< \*\*P0.001very highly significant< \*\*\*PHDL,( high-density lipoprotein) LDL( Low-Density Lipoprotein) VLDL( Very Low-Density Lipoprotein) TG(Triglyceride) HDL, LDL ,VLDL, TG, (P>0.05)

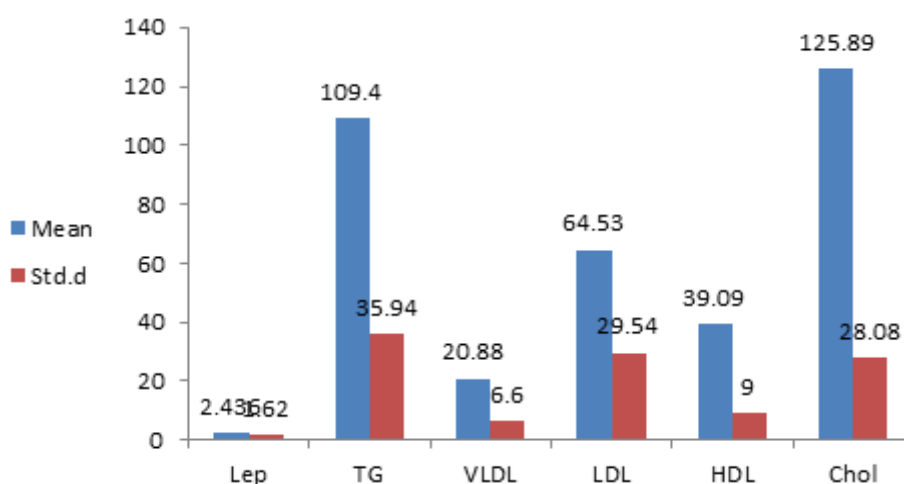


Fig-1. Serum Lipid Profile and Leptin in Control

Source: Libyan children, Department of Pediatrics, Faculty of Medicine, Benghazi University, Benghazi

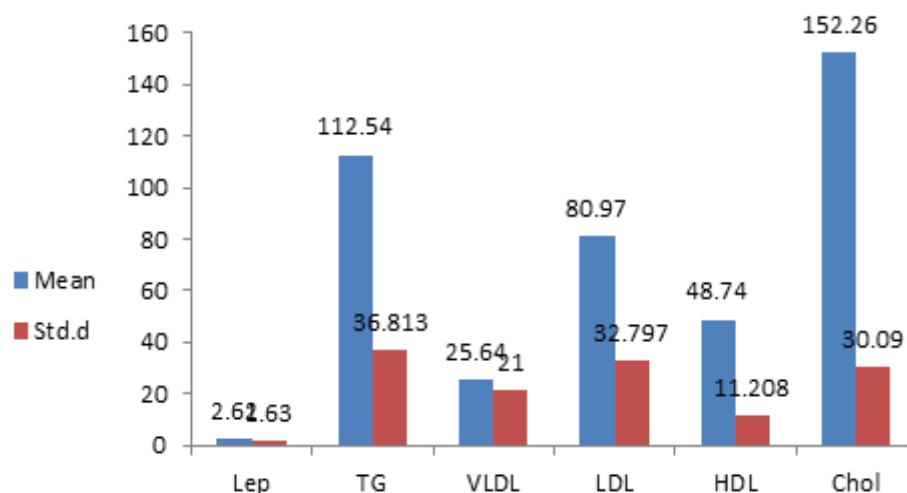


Fig-2. Serum Lipid Profile And Leptin concentration in non-obese asthmatic child

Source: Libyan children, Department of Pediatrics, Faculty of Medicine, Benghazi University, Benghazi

**Table-2.** Correlations between Serum lipid and Leptin in Normal children (CONTROL)

N=30	leptin	TG	VLDL	LDL	HDL	CHOL
CHOL	0.75	0.20	0.06	0.00**	0.35	
HDL	0.98	0.64	0.29	0.01*		0.35
LDL	0.93	0.91	0.33		0.01*	0.00**
VLDL	0.11	0.00**		0.33	0.29	0.06
TG	0.06		0.00**	0.91	0.64	0.20
leptin		0.06	0.11	0.93	0.98	0.75

Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

**Table-3.** Correlations Between Serum lipid and Leptin in non-Obese asthmatic children

N=40	leptin	VLDL	TG	LDL	HDL	CHOL
CHOL	0.41	0.79	0.12	0.00**	0.34	
HDL	0.95	0.90	0.68	0.19		0.34
LDL	0.33	0.99	0.70		0.19	0.00**
TG	0.92	0.10		0.70	0.67	0.12
VLDL	0.32		0.10	0.99	0.90	0.79
leptin		0.32	0.92	0.33	0.95	0.41

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

**Table-4.** Correlations between Serum lipid, and Leptin in Normal children and non-Obese asthmatic children

N=70	CHOL	LDL	VLDL	HDL	TG	leptin
CHOL		0.00**	0.25	0.09	0.04*	0.83
HDL	0.09	0.20	0.87		0.68	0.87
LDL	0.00**		0.58	0.20	0.64	0.50
VLDL	0.25	0.58		0.87	0.00**	0.63
TG	0.04*	0.64	0.003**	0.68		0.26
Leptin	0.83	0.50	0.63	0.87	0.26	

Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

#### 4. DISCUSSION

It was earlier reported that there was a strong correlation between serum leptin concentration, cholesterol and LDL. Similar observations were reported by Bedir et al in healthy men. Rather serum leptin levels show stronger correlation with BMI and therefore obesity. In the present study the children taken for the study were not obese or overweight. This was done with a view to find whether serum lipid profile and leptin levels play a role in precipitating or aggravating asthmatic condition in Libyan children. But the associations between serum leptin levels, serum lipid and obesity with asthma are not well understood. In some studies, it was shown that serum cholesterol, triglyceride, LDL and VLDL levels decreased in asthmatic children compared to the control group, while HDL-C was elevated [6]. In the present study the levels of serum total cholesterol, LDL cholesterol, triglycerides, VLDL-cholesterol and HDL cholesterol were increased in the non-obese asthmatic children. This finding is quite contrary to another study, which had reported a decrease in total cholesterol, LDL cholesterol, triglycerides with an increase in HDL cholesterol in children with asthma [6]. The increase in serum total cholesterol was found to be due to increases observed in LDL and HDL cholesterol levels in the present study. Therefore it appears that serum cholesterol level may be one of the major triggering factors for inflammatory response in non-obese Libyan asthmatic children. Previous studies have shown that hypercholesterolemia may induce the release of higher levels of proinflammatory cytokines [7] cellular adhesion molecules [8] and inflammation sensitive plasma proteins [9].

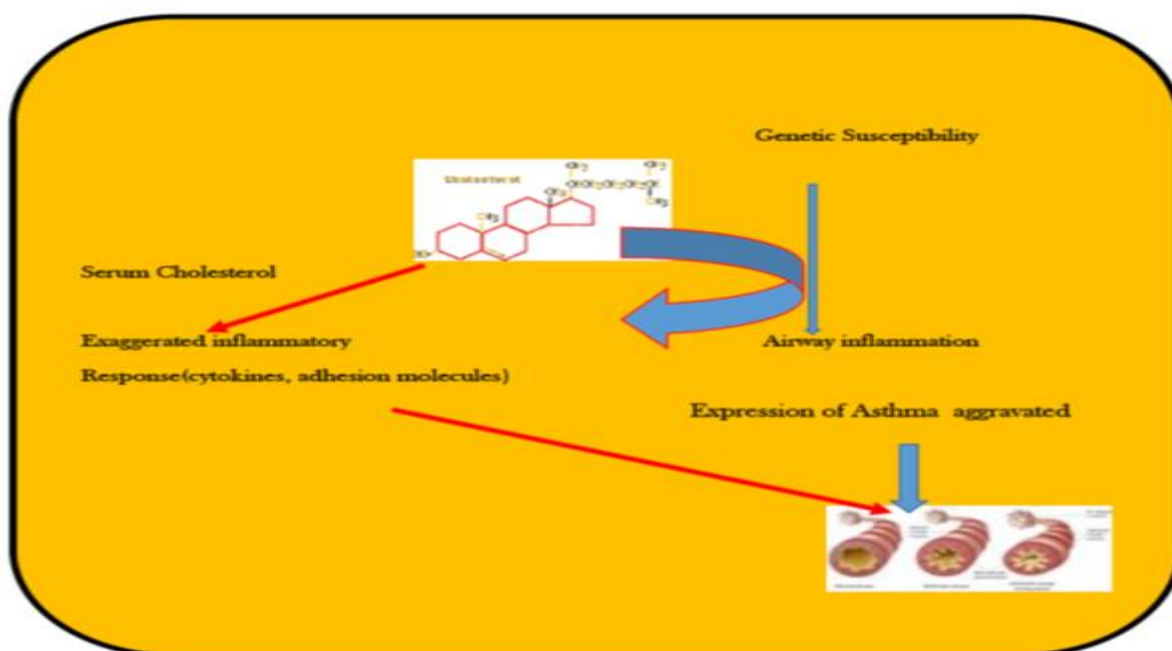


Fig-1. Possible role of Serum Cholesterol in inflammatory response and expression of Asthma

Source: Engström, et al. [8]

The activation of proinflammatory response may be due to Th1 cells response or Th2 cell response. Th1 T cells release predominantly interferon  $\gamma$  (IFN- $\gamma$ ) and IL-2 and are involved in the delayed hypersensitivity immune reactions, and Th2 T cells release predominantly IL-4 and IL-5 and are predominantly involved in IgE-mediated allergic inflammation.

The purpose studying the serum leptin levels and serum lipid profile in Libyan children were to assess the correlation between these parameters and the possible link between serum leptin levels and asthma. It was based on the observations that suggested structural and functional homology between leptin and interleukin 6 (IL-6). Such structural homology may explain that leptin may influence cytokine production and therefore, elicit from T-lymphocytes increased TH1 response [10].

Therefore leptin may stimulate the release of proinflammatory cytokines IL-6, Interferon- $\gamma$ , and tumor necrosis factor (TNF- $\alpha$ ) from the adipose tissue and may promote Th1 responses [11, 12] possibly in obese children. Therefore in the present study there was no significant difference in serum levels of leptin between the non-obese asthmatic children compared to the control subjects. This may due to the fact that leptin may play greater role as a proinflammatory marker in obese asthmatic children compared to non-obese asthmatic children [5, 8, 9]. Further studies are being carried out in obese asthmatic Libyan children to evaluate the possible role of leptin in asthma.

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