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Correlation between Human Boca virus and IL-23in some Iraqi patients with ischemic heart disease

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ABSTRACT: Heart diseases in the Iraqi population are a significant public health concern. Iraq has experienced in the prevalence of heart diseases, including coronary artery disease, heart failure and hypertension. Different researches have shown that human Boca virus (HBoV) may be a risk factor, for some cardiac disorders. Hence, goals of resent work is to investigate roles of human Boca virus in ischemia heart disease (IHD) and to investigate roles of serum level of IL-23 in these diseases. 40 heart diseases patients and 40 controls were included. Controls were females (n=30) followed by males (n=10), while patients with IHD were 27 males and 13 females. There were highly significant variations in ages of patients and controls with ($p \leq 0.01$). The mean ± SE of age of patients with IHD was 37.90 ±0.75 years, while the mean ± SE of controls was 40.52 ±0.79 years. Lipid profile was measured. There were significant variations between patients' and controls. Also, mean ± SE of HDL was statistically significant between ischemia and control groups (85.28 ±4.31 and 55.10 ±1.23 mg/dl) with $p \leq 0.01$, respectively. The serum levels of IgG and IgM were assessed using ELISA. There was no significant variation in mean ± SE of serum level of IgM between ischemia and healthy controls (0.251 ±0.04 and. 0.341 ±0.07 ug/Ml). respectively. There were significant variations in mean ± SE of serum level of IgG between ischemia and controls (0.723 ±0.16 and. 0.076 ±0.004 ug/ml). There were highly significantly differences in Mean ± SE of serum level of 1L-23 between IHD heart diseases (0.407 ±0.073 Pg/mL) and healthy controls (0.0121 ±0.003 pg/mL) with $p<0.001$, respectively.

Keywords: IL23, IHD, Heart disease and EILSA

1. INTRODUCTION

Interleukin 23 (IL-23) is a hetero dimeric cytokine of the IL-12 superfamily [1]. It is composed of p40, a subunit of IL-12, and p19, which is a unique subunit for IL-23 function [2]. Innate immune cells such as dendritic cells or monocytes/ macrophages produce IL-23 [3], which involved in development and stabilized T CD4+ naïve cells, T helper type 17 (Th17 cells) [4]. Th17 and Th1 cells are implicated in the pathogenesis of atherosclerosis and are upregulated in patients with acute coronary syndromes [5]. Interleukin-23 has been implicated in several autoimmune inflammatory disorders [6], cardiovascular disease (CVD) [7] and Congestive heart failure (CHF) [8], Different heart diseases, including coronary heart disease (CHD) and atherosclerotic heart disease are associated with increased levels of proinflammatory cytokines [9]. Cardiomyopathy may be confined to the heart or may be part of a generalized systemic disorder, often leading to cardiovascular death or progressive heart failure [10]. Myocarditis is inflammatory illnesses of the heart, which cause damage to the heart muscle (with non-ischemic myocyte necrosis). Myocarditis may cause persistent dilated cardiomyopathy, abrupt death, or acute failure of heart, among other complications and symptoms. In the context of infection and severe responses of vaccine or drug, the possibility of misdiagnosed and/or subclinical acute ischemia, with an undetermined potential for later symptoms, provides added obstacles for detecting an acute illness [11]. Despite improvements in ischemia heart disease (IHD) preventive and treatment efforts over the last several years, the disorder continues to impose a heavy toll on human health, both in terms of morbidity and

mortality. There is a wealth of knowledge on the cause of myocardial ischemia now available from fundamental, translational, and clinical research. However, the complicated etiology of IHD is suggested by autopsy, angiographic, and clinical results [12], [13]. Several viral infections may accompany with heart diseases, including corona viruses-19, influenza viruses and HBoV. HBoV is recognized member of the family Parvoviridae, Bocavirus genus, subfamilyof Parvovirine,14],[15]. Common childhood illnesses caused by HBoV1 include pneumonia, acute wheezing, bronchiolitis, and the common cold [16]. Due to HBoV1 DNA presence after initial infection and prevalent co-infection with other respiratory viruses, the causal function of HBoV1 has been questioned [17], [18]. The full length of the HBoV genome is 4..7–5.7 kb [19]. Premature birth, asthma, heart failure and congenital heart disease, have all been cited as key risk factors for severe HBoV infections in immunocompromised individuals [20], [21] and many different researchers stated clone correlation between many different disorders and immune markers [22]–[26]. Therefore, the goals of resent work is to investigate roles of human boca virus in myocarditis and ischemia heart disease (IHD) and to investigateroles of serumlevel of IL-23 in these diseases.

2. METHODOLOGY

2.1 STUDIES SEARCH

Forty patients with heart diseases and forty health individuals with different ages and genders, who attended Ghazi AL-Hariri hospital and Iraqi center of heart disease in medical city at Baghdad city, were included in this work during the period of November 2022 and April 2023. The diagnosis of heart diseases was investigated according to the medical history of patients and their clinical checks using electrocardiogram(ECG) and echocardiogram(ECHO).

2.2 BLOOD SAMPLES

Each patient and control participant had 5 mL of venous blood drawn. In order to extract serum, the blood was poured into gel tubes. After an hour of clotting at 4 degrees Celsius, the serum was centrifuged at 2000 rpm for 10 minutes [27].

2.3 MEASUREMENT OF HBoV1 SERUM LEVEL OF (IgG AND IgM ANTIBODIES) LEVELS

At -20ºC, the sera were kept in Eppendorf tubes (1.5 ml) until usage. Double antigen sandwich ELISA (E-Lab science, USA) was directly utilized to determine IL-23, HBoV1, IgM and IgGAbs.

2.4 STATISTICAL ANALYSIS

The impact of independent variables on the research parameters was determined using the Statistical Analysis System- SAS (2018) software. The Chi-square test was employed in this study to identify statistically significant disparities between percentages at significance levels of $p < 0.05$ and $p < 0.01$ [28].

3. RESULTS AND DISSCUSSION

The results in table 1 indicated that the majority of healthy individuals were females (n=30) followed by males (n=10). Patients with ischemia were included 27 males and 13 females. There were significant variations among males and females in different studied groups. Diseases percentage were higher in males than females.

Table 1. - Distribution of sample study according to Gender

Factor		Male	Female	P-value
	Ischemia (No= 40)	27 (67.50%)	13 (32.50%)	0.0094 **
	Control (No= 40)	10 (25.00%)	30 (75.00%)	0.0037 **
	p-value	0.0074 **	0.0079 **	---

** (P≤0.01).

According to the result of this work, males were likely to suffering with these diseases. In corresponding with these findings, the prevalence of IHD was greater in males than in women (1,786 vs. 1,522 instances per 100,000) due to the well-known risk factor of male gender. IHD is chronic, since its prevalence continues to outpace its incidence across all age groups [29]. According to the results in table [2], indicated highly significant variations in patients ages and controls with (p≤0.01). The mean ± SE of age of patients with ischemia was 37.90 ±0.75 years, while the mean ± SE of controls was 40.52 ±0.79 years.

Table 2. - Distribution of sample study according to Age

Groups	N=120	Mean ± SE Age (year)
Ischemia	40	37.90 ±0.75 c
Control	40	40.52 ±0.79 b
P-value	---	0.0001
** (P≤0.01)		

Heart disease is a leading killer worldwide, particularly in poorer regions. The World Health Organization reports that heart disease was responsible for 18.50% of all deaths in Iraq in 2017, placing the country in the 19th position worldwide [30].The mean ± SE of age of patients with IHD was 37.90 ±0.75 years, which disagreed with [31], who reported that 55.2 ± 8.9 years was the mean age ± SE among the participants with IHD. The age of IHD onset also appears to be earlier in males. Age is a risk factor, since the incidence rises in the fourth decade of life and then plateaus. In study conducted by [32], the mean age of healthy controls was 38.5 years and the mean age of patients was 55 years. The results in table 3 indicated that there were significant variations in mean ± SE of triglyceride between both patients' groups and controls . Also, mean ± SE of HDL was statistically significant between ischemia and control groups (85.28 ±4.31 and 55.10 ±1.23 mg/dl) with p≤0.01, respectively. No significant variations in mean ± SE of cholesterol, LDL and VLDL were observed among the studied groups.

Table 3. - Comparison between difference groups in Lipid profile among patients and controls

Groups	Mean ± SE (mg/dl)				
	Triglyceride	Cholesterol	HDL	LDL	VLDL
Ischemia	131.00 ±10.39 a	132.00 ±5.26	85.28 ±4.31 a	85.28 ±4.31	25.96 ±2.10
Control	87.45 ±2.51 b	138.05 ±3.56	55.10 ±1.23 b	93.52 ±1.49	27.58 ±1.05
P-value	0.0035	0.438	0.0001	0.427	0.889
** (P≤0.01).					

In addition, this study concluded that HDL in serum of patients was higher in groups of patients in compared with controls. HDL does have some protective effects against metabolic disorders, cardiovascular disease, and immune system inflammation. One of its most notable features is the facilitation of cholesterol efflux from cells to the liver (also known as reverse cholesterol transport) [33]. In study conducted by [34], Independent of LDL-C and therapies, high TG and low HDL-C are linked to coronary atherosclerotic disease-related outcomes. HDL was higher in patients with chronic obstructive pulmonary disease (COPD), including IHD, than in controls in study conducted by [35] in corresponding with this work. High triglyceride levels are associated with an increased risk of coronary heart disease (CHD) and IHD [36], [37]. According to the results in figure1, there was no significant variation in mean ± SE of serum level of IgM between ischemia group and controls (0.251 ±0.04 and. 0.341 ±0.07 ug/ml), respectively.. On another hand, there were significant variations in mean ± SE of serum level of IgG between ischemia and controls (0.723 ±0.16and. 0.076 ±0.004 Ug/mL),) respectively.

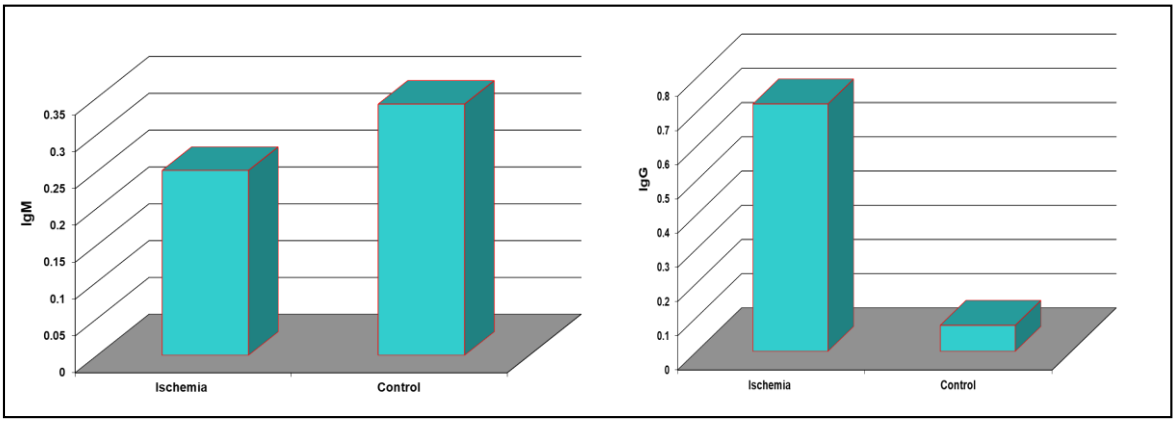

FIGURE 1. - Comparison between difference groups in IgM and IgG among patients and controls

This study reported that serum level for HBoV was higher in IHD than controls. Long persistence durations and high frequency of the virus might account for high frequencies of coinfections and the existence of HBoV1 in asymptomatic people. It has been hypothesized that HBoV1 may reactivate after a superinfection with another virus, and it has been reported to remain in mucosa for more than four months after initial infections, increasing the likelihood of co-existence with other viral or bacterial pathogens [38].. Specific (IgG), antibodies were found in 96% of the serum

samples, but neither HBoV-specific IgM nor HBoV DNA was found in any of the patients serum samples [39]. Observation of the virus in cardiac tissue samples obtained after surgery on healthy patients is indicative of its cardiotropic properties. Variations in HBoV incidence exist among countries owing to cultural, healthcare, topographical, meteorological and socioeconomic factors [40].

There were highly significantly differences in Mean ± SE of serum level of 1L-23 between group of HDI heart diseases, (0.407 ±0.073 pg/mL) and healthy controls (0.0121 ±0.003 pg/mL) with p<0.001, respectively.

Table 4.- Comparison between difference groups in level of 1L-23.

Group	Mean ± SE IL-23 (pg/mL)
Ischemia	0.407 ±0.073 a
Control	0.0121 ±0.003 b
p-value	0.0001
** (P≤0.01).	

Interleukin-23 (IL-23) is cytokine that is involved in the pathogenesis ofIHD. It is primarily produced by. antigen-presenting cells(APC) and actions on T cells to support their difference into, Th17, cells, which produce IL-17. Elevated levels of IL-23 have been observed in patients with myocarditis, suggesting its potential role in driving the inflammatory response within the heart muscle [41].

4. CONCLUSIONS

This study concluded that males more likely to suffering from ischemia heart diseases. Also, increase in IgM and IgG HBoV among patients indicated that HBoV may be a risk factor for this disease. Increase in IgM HBoV in patients with ischemia heart disease, making this antibody as a biomarker for this disease. Comparative analysis of serum levels of these cytokines in patients with IHD and healthy controls provides valuable insights into the immunological mechanisms underlying myocardial inflammation.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest

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