The role of diagonal earlobe as evidence of coronary artery disease in a Salahiddin province- Iraqi population

Omar Raheem Khalaf AL-Obaidi¹, Rasha Abduladheem Yaseen¹

¹Biology Department .University of Samarra,, Samarra, Salah El-den Iraq

Abstract. There are several dermatological indicators associated with Coronary Artery Disease CAD, which contribute the early diagnosis the seriousness of coronary artery disease. It is these indicators Diagonal Earlobe Crease DELC, which showed some studies a relationship between them and coronary artery disease, but Iraqi population data are limited. Therefore included the study (100) Iraqi samples has been taken from patients with CAD and 50 without CAD. The results showed values cardiac risk factors, which included the age, Body Mass Index BMI, Hypertension, Diabetes, Hypercholesterolemia, Hypertriglycerimia. HDL, as it was increased significantly the patients with CAD compared to controls. Results showed prevalence of ELC and PAC was 64%, 73% respectively in those with CAD while the prevalence of ELC and PAC was 11%, 16 % respectively in those without CAD. Cases with DELC were increased prevalence significantly of both any, associated with coronary artery than those without DELC. The odds ratio for diagonal earlobe crease was 6.30, and for Preauricular crease was 5.74.

Keywords: Diagonal earlobe crease, Coronary artery disease, Iraqi population

1 Introduction

Coronary Artery Disease CAD is still one of the highest causes of mortality in the Arabs population adults, with significant age-associated increased prevalence [1]. The adoption of CAD prevention methods and early clinical detection are priority public health actions [2]. Many of these adverse events are in individuals free Prodromal symptoms and often without cardiac risk factors, such as hypertension, hyperlipidemia, diabetes, tobacco use, obesity, or sedentary lifestyle [3].

This “detection gap” has spurred researchers to attempt to find dermatological indicator signs that might identify individuals at high risk of CAD[4]. Some of these dermatological indicator signs may be present in the Diagonal Earlobe Creases DELC (unilateral or bilateral) [5]. Historically, several study findings were associated between CAD and DELC, Frank’s 1973 showed of the clinical study in which DELC was considerably more common (47%) among all age groups of patients (N=531) hospitalized in a USA coronary-care unit after an acute myocardial infarction than among age matched control subjects [6]. In 1978, Kaukola reported on the correlation between DELC and CAD, He evaluated 219 patients with an acute myocardial infarction [7]. A similar Irish study evaluated the relationship between DELC and Coronary Artery Atherosclerosis CAA confirmed by electrocardiogram, among 247 unselected
males and female patients admitted to a coronary-care unit in hospital. DELC was significantly correlated with-in both sexes [8].

Celik et al 2007, showed the first report on the relationship between DELC and carotid artery (Atherosclerosis) imaged by B-mode ultrasound among a group of Turkish subjects, A subjects with DELC (unilateral or bilateral) had significantly higher Carotid artery Intima-Media Thickness CIMT compared to age and gender matched controls without DELC [9].

As well as in 2009, Shrestha et al. The report on 212 patients in Japan. Approximately 30% of the patients had a DELC, which demonstrated an independent association with CIMT. There was also a significant relationship between DELC and atherosclerosis [10]. Moreover, Friedlander in 2010 showed the results of an observational study on the prevalence of DELC in 10 consecutive asymptomatic Neurologically patients referred for confirmation of the presence of a Calcified Carotid Artery Atheroma CCAA[11]. The study aims to show the relationship between the presence of dermatological findings DELC in Iraqi patients and coronary artery disease CAD submitted to coronary angiography.

2 Subjects and Methods

This study was carried out in the hospital of Samarra in Salah El-Den province for the period from 12 July 2017 to 15 October 2017. One hundred male patients of a mean aged (59±10.0) years (range40-75) with coronary artery disease history, who had been submitted to Coronary Arteriography CAG. In addition, fifty healthy male volunteers aged means (52.92±7.55) years (range 39-69) referred to the control group. Body Mass Index BMI was calculated as weight divided by height squared (Kg/m²). Patients were excluded if they take any medication treatment. Blood pressure is commonly expressed as systolic/diastolic.

Blood samples (7 ml) were collected for each person with the permission to measure lipid profile. All blood samples were collected by vein puncture and allowed to clot at room temperature for 30 minutes. Serum samples obtained after centrifugation at 4000 rpm for 15 minutes. Serum was removed with Micropipette, stored at -20c º, and used for the estimation of Lipid profile: the levels of Total Cholesterol TCH, Triglycerides TG, and High-Density Lipid cholesterol HDL; have been estimated among patients using enzymatic and colorimetrics method. Using kit from Radnox company, UK. determination of Glucose: kit from Randox Laboratories limited company, UK was used to determine glucose.

The prevalence of diagonal Earlobe Crease ELC, Preauricular Crease PAC, was measured in cases and controls.

2.1 Bio statistical analysis

The results were expressed as mean ± SD. T-test was used for assessment of the results. Significant variation was considered when the P value < 0.05.

3 Results

The results in table (1) demonstrating that the mean age of patients assessed was over 50 years and clearly showed the elevated in BMI in patients with CAD estimated 32.46 kg/m² compared with healthy ones 26.79 kg/m², the mean value differences were highly significant increased (p<0.05). As for the pathological factors effects of infection with CAD pressure and diabetes, the result showed a significant high in systolic and diastolic pressure in patients with CAD compared to control. And the value of mean reached 139 and 92.53mm Hg in patients, respectively compared to control. Which the value reached 123 and 82.66 mm Hg respectively. For diabetes, the results show a significant high glucose concentrations in patient's serum, which reached to 148.26 mg/dL as, compared with its level in control 83.6 mg/dL.
The result of concentration measure for (cholesterol, triglyceride, HDL) in patients with CAD refers to high significant mean levels of cholesterol 224.17 mg/dL compared control 159.12 mg/dL. For triglyceride, it was 229.62 mg/dL in patients with CAD compared with control 137.28 mg/dL. For HDL level, there are low significant in HDL levels in patients with CAD which reached to 35.47 mg/dL as compared with control 44.40 mg/dL.

Table 1: Rate of risk factor in patients and controls

| Parameters                  | Patients (n=100) mean ± S.D | Control (n=50) mean ± S.D | p-value |
|-----------------------------|-----------------------------|---------------------------|---------|
| Age (years)                 | 60±10.0                     | 52.92±7.55                | < 0.05  |
| BMI(kg/m²)                  | 32.46± 0.61                 | 26.79±0.61                | < 0.05  |
| Systolic pressure (mm Hg)   | 139 ± 1.08                  | 123 ± 0.87                | < 0.05  |
| Diastolic pressure (mm Hg)  | 92.53 ± 0.84                | 82.66 ± 0.58              | < 0.05  |
| Diabetes (mg/dL)            | 148.26 ± 1.85               | 83.6 ± 2.18               | < 0.05  |
| Cholesterol (mg/dL)         | 224.17 ± 4.22               | 159.12 ±3.96              | < 0.05  |
| Triglycerides (mg/dL)       | 229.62±6.69                 | 137.28±6.24               | < 0.05  |
| HDL (mg/dL)                 | 44.40±1.03                  | 35.47±0.63                | < 0.05  |

The diagonal earlobe (bilateral) presence of ELC and PAC was associated with CAD Table (2) and figure (1).

Table 2: Prevalence of diagonal earlobe ELC and PAC in patients and controls

| parameters | Patients n=100 | Control n=50 | OR |
|------------|----------------|--------------|----|
|            | observed       | %            | observed | %   |     |
| ELC        | 64             | 64           | 11      | 22  | 6.30|
| PAC        | 73             | 73           | 16      | 32  | 5.74|
| ELC+PAC    | 53             | 53           | 9       | 18  | 5.13|

OR = Odds Ratio

The results as shown in table (2) Prevalence of diagonal earlobe ELC and PAC in patients with CAD, as was the percentage of 64% and 73% respectively compared to controls, which reached 11% and 16 % respectively. As the percentage, his appearance together ELC and PAC in patients 53% it is more than control, which reached 18%. The odds ratio for diagonal earlobe crease was 6.30 and for Preauricular crease was 5.74.
4 Discussion

Shows the results in table (1) high average age of disease to over 50 years, compared to controls. This agreed that stated Sias et al 2005, it confirmed that the male more susceptible CAD after the age of 55 years [12]. As it works hormone testosterone to reduce the effectiveness of the enzyme Lipoprotein Lipase LPL that increases the crash evidenced so high cholesterol level and increase the amount of blood lipids, which effect the CAD [13]. As shown results, high Body mass index BMI for patients compared to controls, and this confirmed AL-Gebori et al 2013 with his study that Iraqi people (patients) with atherosclerosis high coefficient of the BMI compared to controls [14].

Moreover shown results a high significantly at the level of hypertension and diabetes in patients compared to controls. This agreed with Khalaf 2015 at his study risk factors that cause disease atherosclerosis [15]. As found to increase significantly in the level of hypertension and diabetes in patients, as the cause of each of the rise in hypertension and diabetes an increasing oxidation stress which increase the generation of free radicals contributing in the development of infection [16].

In addition shown results high concentration of all cholesterol and triglyceride in patients compared to control, while reducing the concentration of HDL in patients compared to controls. This agreed with Heidari et al 2013, where both cholesterol and triglyceride were found to be significantly higher in the infected Iranian patients with CAD compared with controls, whereas HDL concentration was reduced in patients with CAD compared with controls [17].

This study showed in table (2) relationship between that ELC and PAC and CAD. This is consistent with Edston et al 2006 when we found that among northern Europeans coming to autopsy (mean age 60) the prevalence of DELC is 75% [18].

While Toyosaki et al 1986 found the prevalence among native Japanese where it is only 5%[19]. Moreover there are many studies, which showed a very strong relationship between DELC and coronary artery disease [20-22]. We observed a 34.1% associated of DELC among our patients. Lichstein et al 1974, confirmed that unilateral or bilateral DELC was common Significant more than (47%) among patients hospitalized in USA coronary-care unit[5]. However, most of the above evidence supported the association between DELC and CAD, the underlying pathophysiological mechanisms is still unclear [22-23]. The suggested items might include degeneration of elastin and unbalanced ratio of collagen to elastin. Were similarly seen in biopsy specimens taken from the earlobes and the coronary bed. Merlob et al 1981 found the primary role
of ageing was mostly postulated, since DELC was rare in infants[24]. And Japanese male patients having DELC had shortened telomeres in peripheral white blood cells, again implicating aging [23].

In addition, have suggested that the same originated genetically end-arterioles and similar leukocyte antigen sub-types for both DELC and CAD [25]. Choi et al 2009 referred to the DELC might be the earliest manifestation of a generalized vascular disease and subclinical atherosclerosis [26].

Sapira 1991 explained that the relationship between DELC and CAD, caused due to earlobe collagen consists of peptide chains resembling those present scavenger Macrophage receptor used for the ingestion of athermanous cholesterol [27].

5 Conclusions
To the best of our knowledge, this is the first report showing a significant correlation between DELC and CAD diagnosed by CAG in Iraq. The DELC can be considered as an initial indicator of the risk of CAD.

References
[1] Tehrani DM Seto AH. 2013. Third universal definition of myocardial infarction: update, caveats, differential diagnoses. Cleve Clin J Med.; 80 (12):777–86.
[2] Cotton SG, Nixon JH, Carpenter RG, Evans DW. 1972. Factors discriminating men with coronary heart disease from healthy controls. Br Heart J.; 34:458–64.
[3] Trevisan M, Farinario E, Krogh V, Jossa F, Giumetti D, Fusco G, et al. 1993. Baldness and coronary heart disease risk factors. J Clin Epidemiol.;46(10): 1213–8.
[4] Pomerantz HZ.1962. The relationship between coronary heart disease and the presence of certain physical characteristics. Can Med Assoc J.;86:57–60.
[5] Lichstein E, Chadda KD, Naik D, Gupta PK. 1974. Diagonal ear-lobe crease: prevalence and implications as a coronary risk factor. N Engl J Med.;290 :615-6.
[6] Frank ST.1973. Aural sign of coronary-artery disease. N Engl J Med 289:327-8.
[7] Kaukola S. 1978. The diagonal ear-lobe crease, a physical sign associated with coronary heart disease. Acta Med Scand Suppl.;619:1-49.
[8] Moraes D, McCormack P, Tyrrell J, et al .1992. Ear lobe crease and coronary heart disease. Ir Med J 85:131
[9] Celik S, Erdoğan T, Gedikli O, Kiriş A, Erem C.2007. Diagonal ear-lobe crease is associated with carotid intima-media thickness in subjects free of clinical cardiovascular disease. Atherosclerosis. ;192:428-31.
[10] Shrestha I, Ohtsuki T, Takahashi T, Nomura E, Kohriyama T, Matsumoto M. 2009. Diagonal ear-lobe crease is correlated with atherosclerotic changes in carotid arteries. Circ J.;73:1945-9.
[11] Friedlander AH. 2010. Association between clinically identified diagonal earlobe creases and calcified carotid artery atheromas evidenced on panoramic radiography. J Oral Maxillofac Surg.;68:227-8.
[12] Sias, B ., Ferrato, F. , Pillcer, R. M. , Forgerty, Y. , Guillouet, P.H. , Leboeuf, B. , Carriere, F. 2005. Cloning and seasonal secretion of the pancreatic lipase-related protein 2 present in goat seminal plasma. Biochim. Biophys.Acta, , vol. 1686, p. 169-180.
[13] Betteridge, P. and Illingworth, L., 2000.Lipoproteins in health and disease ,Edward Arnold ,3rd Edition,ch.12: 134-145.
[14] AL-Gebori, A. M.; Adeeb, S. S.; Alwan, G. H.; et al. 2013. Correlation of Total Cholesterol and Glucose in Serum of Iraqi Patients with Atherosclerosis and Diabetes Mellitus Type 2. *Eng. &Tech. Journal. Vol31, Part (B), No. 6*: 801-801.

[15] Khalaf, O. R. 2015. Study of Relationship between Polymorphisms lipoprotein lipase gene and effect on lipid metabolism and concentrations in patients Athero- sclerosis. A Thesis PhD. college of Education University of Tikrit.

[16] Phillips, C., Mullan, K., Owens, D. and Tomkin, GH., 2004. Microsomal Triglyceride Transfer Protein Polymor- phisms and Lipoprotein Levels in Type 2 Diabetes. O.J.M. Vol. 97, No. 4: 2115-2127.

[17] Heidari, M. M.; Foruzannia, S. K.; Khatami, M.; Hadadzadeh, M.; Meybodi, M. E. 2013. Apo lipoprotein E Gene Polymorphism in Iranian Coronary Atherosclerosis Patients Candidate for Coronary Artery Bypass Graft. *Iran J Basic Med Sci*; 16: 841-844.

[18] Edston E. 2006. The earlobe crease coronary artery disease and sudden cardiac death: an autopsy study of 520 individuals. *Am J Forensic Med Pathol.* 27:129-33.

[19] Toyosaki N, Tsuchiya M, Hashimoto T, Kawasaki K, Shiina A, Toyooka T, et al. 1986. Earlobe crease and coronary heart disease in Japanese. *Heart Vessels.* 2: 161-5.

[20] Shmilovich H, Cheng VY, Rajani R, Dey D, Tamarappoo BK, Nakazato R, et al. 2012. Relation of diagonal ear lobe crease to the presence, extent, and severity of coronary artery disease determined by coronary computed tomography angiography. *Am J Cardiol.* 109(9): 1283–7.

[21] Gutiu I, el Rifai C, Mallozi M. 1986. Relation between diagonal ear lobe crease and ischemic chronic heart disease and the factors of coronary risk. *Med Interna.*;24(2):111–6.

[22] Friedlander AH, Lopez-Lopez J, 2012. Velasco-Ortega E. Diagonal ear lobe crease and atherosclerosis: a review of the medical literature and dental implications. *Med Oral Patol Oral Cir Bucal.* 17(1):e153–9.

[23] Higuchi Y, Maeda T, Guan JZ, Oyama J, Sugano M, Makino N: 2009. Diagonal earlobe crease are associated with shorter telomere in male Japanese patients with metabolic syndrome. *Circ J, 73*:274–279.

[24] Merlob P, Amir J, Reisner SH: 1981. Diagonal earlobe crease in newborn infants and in children. *Clin Pediatr (Phila), 20*:739–740.

[25] Doering C, Ruhsenberger C, Phillips DS: 1977. Ear lobe creases and heart disease. *J Am Geriatr Soc, 25*:183–185.

[26] Choi SI, Kang HC, Kim CO, Lee SB, Hwang WJ, Kang DR: 2009. Relationship between earlobe crease and brachial-ankle pulse wave velocity in non-hypertensive, non-diabetic adults in Korea. *Epidemiol Health, 31*:e2009002.

[27] Sapira JD: 1991. Earlobe creases and macrophage receptors. *South Med J,84*:537–538.