



STUDY TO EVALUATE THE FREQUENCY OF DIAGONAL EARLOBE CREASE AS A MARKER OF CORONARY ARTERY DISEASE AND ITS RISK FACTORS IN TERTIARY HOSPITAL OF EAST INDIA.

Cardiology

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ABSTRACT

Background: In coronary artery disease (CAD), the DELC (diagonal ear lobe crease) has been proposed as a marker but association remains controversial. The aim of the present study was to evaluate the frequency of DELC in patients with CAD.

Materials and Methods: One hundred fifty four patients with coronary artery angiography proven CAD from RIMS, Ranchi, Jharkhand, India were evaluated for the presence or absence of DELC. The DELC was said to be present if the patient had crease extending diagonally from the tragus across the lobule to the rear edge of the without discontinuity.

Observation: DELC was seen in 82 patients out of 154, and the prevalence was 53.24%. Prevalence of Hypertension, diabetes and dyslipidemia were 38.3%, 33.8% and 24.0% respectively and hypertension, diabetes and dyslipidemia were insignificant (P=0.245, P=0.526, P=0.203 respectively). There were 43 smoker (27.9%) and DELC with smoking was significant with p value (0.021).

Conclusion: The frequency of DELC in patients with CAD was high in our study. The data suggest that the DELC sign may be a useful marker for the presence of CAD in patients and may help in early segregating at risk patient of CAD.

KEYWORDS

Coronary artery disease, diagonal earlobe crease, Frank's sign.

Introduction

Sanders T. Frank in 1973 had a letter published in the New England Journal of Medicine describing 20 of his patients with an earlobe crease, who were under 60 years old, chest pain and proven coronary artery disease. Frank's sign is a diagonal ear lobe crease (DELC) extending diagonally from the tragus across the lobule to the rear edge of the auricle^[1]. Some studies have described Frank's sign as a marker of cardiovascular disease but not linked to the severity of the condition^[2].

Since than many study have been performed including autopsy based favoring association of DELC and CAD. DELC can be seen at once by examiner. There have also been reported cases of Frank's sign assisting in the diagnosis of cerebral infarctions. A link between Frank's sign and premature aging and the loss of dermal and vascular fibers has also been hypothesized^[3]. Hence, the aim of the present study was to evaluate the frequency of DELC in patients with CAD.



Figure 1: man with a very well-defined diagonal ear lobe crease on the right side showing with black arrow head.

Material and methods:

A cross-sectional study of 154 patients admitted in cardiology department with CAD diagnosed by angiography was done in RIMS Ranchi, Jharkhand state, India, from January 2016 to June 2017. CAD was defined as $\geq 50\%$ luminal diameter stenosis in one or more major epicardial vessel. Blood pressure was measured on 4 hourly during hospital stay and hypertension was defined as systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg; or use of antihypertensive medications.

Obese patients or patients on treatment with lipid-lowering drugs or abnormal lipid profile were classified having hyperlipidemia, and

patients with elevated serum hbA1c $>6.5\%$ or on treatment for diabetes were considered as diabetes. Body mass index (BMI) was calculated by body weight(kg)/height(m²) and smokers were defined by history of smoking cigarette.

The DELC was said to be present if crease extending diagonally from the tragus across the lobule to the rear edge of the auricle without discontinuity, both unilateral and bilateral DELC were considered to be DELC positive. Patients with history of trauma or previous scar marks or piercing, or an incomplete pattern of DELC, in which a diagnosis was in dilemma, were exempted from crosssectional study. DELC were examined carefully and was confirmed by palpation by examiner. Data was entered in SPSS 20 and were analyzed using the Independent Samples T-Test and Chi-square.

Observations:

154 patients were enrolled in this study. Diagonal earlobe crease (DELC) was seen in 82 patients out of 154, and the prevalence of DELC was 53.24%. Among all patients, 52.6% of male patients and 55.0% of female patients had DELC. The mean age of CAD with DELC was 51.29 ± 8.16 years and CAD without DELC was 49.241 ± 6.8 years, age was insignificant in both the group with p value of 0.09. Both the male and female sex were insignificant in both group (p value=0.471).

Prevalence of hypertension, diabetes and dyslipidemia were 38.3%, 33.8% and 24.0% respectively in whole group and in both the group hypertension, diabetes and dyslipidemia were insignificant (P=0.245, P=0.526, P=0.203 respectively).

There were 43 smoker (27.9%) There were significant differences between the two groups regarding smoking habit (P=0.021.), comparing the mean of BMI between the two groups showing no significant difference (P=0.408).

Table 1: Results summarized in below

variable	DELC absent(n=72)	DELC present(n=82)	P value
AGE	51.291 \pm 6.80 year	51.29 \pm 8.16year	0.094
MALE	54 (47.4%)	60 (52.6%)	0.471
FEMALE	18 (45.0%)	20 (55.0%)	0.471

BMI	24.54±1.63 kg/m ²	24.79±2.05 kg/m ²	0.408
DIABETIC	24 (46.2%)	28 (53.8%)	0.526
HYPERTENSIVE	25(42.4%)	34 (57.6%)	0.245
DYSLIPIDEMIA	20(54.1%)	17(45.9%)	0.203
SMOKER	14(32.6%)	29(67.4%)	0.021

Discussion:

This study showed association of DELC with CAD. The association between DELC and fatal cardiovascular disease was investigated in a consecutive series of 303 coroner's necropsies in hospital of Brighton Health District and diagonal creases were present in 123 (72%) of 171 men and 88 (67%) of 132 women^[1]. Study for association of DELC and CAD in a Chinese population was conducted in 449 consecutive Chinese, 250 cases with CAD and 199 without CAD in which the prevalence of DELC was 46.2% in those without CAD and 75.2% in those with CAD ($P < .001$) and Subjects with DELC had more stenotic vessels and higher prevalence of both any and significant coronary artery stenosis than those without DELC ($P < .001$)^[5]. In 1978, Kaukola, an internist at University Hospital in Helsinki, Finland reported on the correlation between DELC and CAD where 219 patients (165 men, and 54 women, age range 32-65 years) evidenced coronary artery atherosclerosis with an acute myocardial infarction for the presence of DELC^[6]. A group of physicians from Copenhagen, Denmark examined all patients (203 women, 320 men) admitted to a medical-surgical unit during a two month period of time for the presence of DELC in patients between the ages of 50 and 59 the prevalence rate (46.8%) of DELC in those with an acute myocardial infarction was significantly greater than in an age matched control group (31.6%)^[7]. Approximately 15 years later, again in Denmark, the Copenhagen City Heart Study, prospectively analyzed a healthy population ($N = 14,223$) of outpatients to determine the relationship between right-sided DELC and the development of a first acute myocardial infarction (AMI) as an indicator of CAD where all enrollees were followed for a 6.5 year interval and those with the DELC were noted to have a statistically significant 1.4-fold (the 95% confidence interval for relative risk was 1.1 – 1.7) increased risk of developing an AMI after controlling for age and sex^[8]. A Turkish study of 415 men and women (mean age 58.9 years) requiring coronary artery angiography for stable angina with a positive stress test, unstable angina, or history of prior myocardial infarct were also evaluated for bilateral DELC where the found highly significant statistically greater prevalence of DELC (51.4%) in those patients with a positive angiogram (as defined as $> 70\%$ stenosis of the luminal diameter in 1 or more of the three epicardial arteries) than in those whose angiogram was normal (15.1%) and observed sensitivity of the bilateral DELC for the diagnosis of CAD was 51%, the specificity 85%, the positive predictive value 89%, and negative predictive value 41%^[9]. In a similar Japanese angiography study two-hundred patients were divided into two groups based upon the results of imaging, where one-hundred and nineteen patients had greater than 50% luminal narrowing of at least one major coronary artery and 81 had no significant atherosclerotic changes in their vessels. DELC was present in 26.1% with stenosis but in only 3.7% without stenosis and the differences between the groups were statistically significant^[10].

Raman study, the DELC was observed in nearly 60% of the urban south Indian population^[11].

The demographic and clinical characteristics of the 154 participants in this study where DELC was seen in 82 patients out of 154, and the prevalence of DELC was 53.24%.

However, some other studies have found no such associations and have concluded that the prevalence of ear lobe creases probably increases with age, as does heart diseases^[12]. Davis et al. reported that the sensitivity and specificity of DELC for detecting CAD were 60% and 48%, respectively; and DELC is not associated with CAD. Rhoads and Yano^[13] also found no association between DELC and CAD in Japanese Americans living in Hawaii. The results of a study by Kuon et al.^[14] showed that ELC does not predict a hemodynamically relevant coronary heart disease.

It should be noted that the different ethnic and racial backgrounds of the population used in different surveys may relevance of the conflicting results. The utility of DELC may also be lower in patients who have a higher pretest probability of CAD. This result showed in this studies showed no relation between DELC and CAD among patient with diabetes, hypertension and dyslipidemia. Limitations of

the study were sample size was small, not an evaluation of DELC frequency in the non-CAD population and not grading of ear lobe crease; recent evidence has pointed out to the relationship between the increasing grades of DELC and the increasing severity of CAD and this study provide no information regarding degree of coronary stenosis with DELC. The data in this study suggest that the DELC prevalence was high in CAD patients and may be a useful sign for the presence of CAD in patients. At last we propose with the help of this study that DELC as a marker of CAD and may help in early segregating at risk patient of CAD.

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