



Detection of diagonal earlobe crease [Frank's sign] as a marker of cardiovascular disease in dental patients: A case control study

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ABSTRACT: AIMS & OBJECTIVES-In this study, we aim to highlight relation of DELC with CHD. We would like to emphasize that this easily identifiable yet routinely missed sign provides a valuable contribution to the dentist in his assessment of patients at risk of ischemic heart disease in dental office. **MATERIAL & METHODS** - The present study was designed as a case-control study. Subjects were recruited from the department of oral medicine and radiology who visited for various dental treatments. 200 patients aged >40 years with proven CHD and patients without evidence of CHD of same age group were enrolled in this study. **RESULT** - There was a significant correlation between DELC and coronary risk factors, such as advancing age, hypertension, male gender and no correlation among DELC, diabetes mellitus and smoking. **CONCLUSION**-The association between DELC and CHD patients was high in our study. The data suggest that the DELC sign may be a useful marker for early detection of CHD in dental patients.

KEYWORDS – Frank sign, Diagonal earlobe crease, Coronary heart disease, Dental patients.

INTRODUCTION –

Coronary heart disease (CHD) is the foremost cause of death worldwide. Annually in India, more than 10.5 million deaths occur and it was reported that CHD led to 20.3% of these deaths in men and 16.9% of all deaths in women.[1] The diagonal ear lobe crease (DELC) or “Frank’s sign” has long been recognized as a potential marker of CHD. Despite its identification over 40 years ago, very few oral care providers are aware of the relevance of Frank’s sign as a cutaneous indicator of coronary atherosclerosis. The presence of DELC and its association with CHD were first described in 1973. Since Frank’s original study, several clinical studies, including autopsy-based and histopathological examinations, have shown an association between DELC and CHD and support the hypothesis that DELC was related to CHD.[2]On the contrary, several studies reported negative results and suggest that it is simply a marker of advancing age[3] and the lack of a theoretical foundation for a causal relationship between DELC and atherosclerosis inhibits the clinical value. This study aim to highlight evidence linking DELC with CHD. The study emphasize that frank sign easily identifiable yet routinely missed sign provides a valuable contribution to the dentist in assessment of patients at risk of ischemic heart disease in dental office.

Material and methods:

The present study was designed as a case–control study. Subjects were recruited from the department of oral medicine and radiology who visited for various dental treatments. A total of 200 patients aged >40 years .

Group I – 100 patients with proven CHD (who had undergone angiography and were found to have CHD)

Group II – 100 patients without evidence of CHD of same age group.

This study was approved by the institutional ethics committee. All participants gave written informed consent.

Routine preoperative evaluation included taking a history and routine examination. Blood pressure was measured on several occasions during dental visits and hypertension was defined as systolic blood pressure ≥ 140 mm Hg or diastolic blood pressure ≥ 90 mm Hg; or use of antihypertensive medications. A modified evaluation sheet designed by Shrestha[2] was used to assess the DELCs. A deep diagonal crease (>1 mm) extending obliquely from the tragus toward the outer border of the ear lobe and covering at least two-thirds of the length of the ear lobe was recorded as a DELC. Unilateral and bilateral DELCs were both considered to be DELC positive [Figures 1 and 2]. Patients who showed an incomplete pattern of DELC, in which a diagnosis of the DELC might be confused, were excluded from the study. All the patients were examined in sitting position.

Fig.1 Positive “Frank Sign” in a female patient



Fig.2 Positive “Frank Sign” in a male patient



Statistical analysis :

Data were expressed as mean \pm standard deviation. Comparison of the categorical or numeric variables between groups was carried out using a Chi-square test or Student’s t-test separately. The multivariate regression model was used to rule out possible mutual association of traditional risk factors (including age, sex, hypertension) with cases and control groups. The sensitivity, specificity, and predictive values of DELC in two genders and four age groups (40–50, 51–60, 61–70, and >70 years old) were computed. A P value of <0.05 was analysis was conducted using Statistical Package for Social Sciences [SPSS] for Windows Version 22.0 Released 2013. Armonk , NY:IBM Corp.

Results :

The demographic and clinical characteristics of 100 cases and 100 controls are shown in tables and graphical format. Total participants (cases and controls) were classified into four age groups of 40-49,50-59,60-69,70-79[shown in fig.3]. The mean age and standard deviation of cases are 25(35.7%),30(42.9%),10(14.3%),5(7.1%) and controls are 8(88.9%), 1(11.1%), 0(0%),0(0%). This difference was statistically significant (<0.05) in cases and controls with different age groups. On comparison of clinical characteristics among cases, statistically significant results (0.05%) were found in gender [shown in fig.4]. There was statistically significant (<0.001) [shown in fig.5]on comparison of presence or absence frank sign in cases(coronary heart disease) and control group.

Fig.3 Comparison of presence of frank sign according to age group type

	Group 1 (Coronary)	Group 2 (Control)	Chi square test value	p value, Significance
40-49	25 (35.7%)	8 (88.9%)	Chi = 9.375	p = 0.025*
50-59	30 (42.9%)	1 (11.1%)		
60-69	10 (14.3%)	0 (0%)		
70-79	5 (7.1%)	0(0%)		

*p<0.05 – significant difference

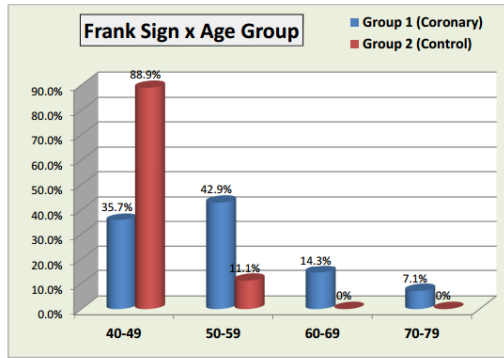


Fig.4 Comparison of presence of frank sign according to gender type

	Male n (%)	Female n (%)	Chi square test value	p value, Significance
Group 1 (Coronary)	75 (75%)	25 (25%)	Chi = 0.231	p = 0.631
Group 2 (Control)	72 (72%)	28 (28%)		

p>0.05 – no significant difference

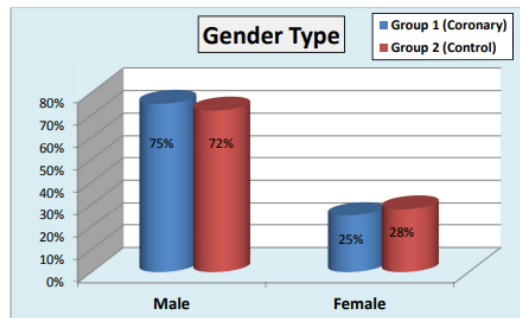
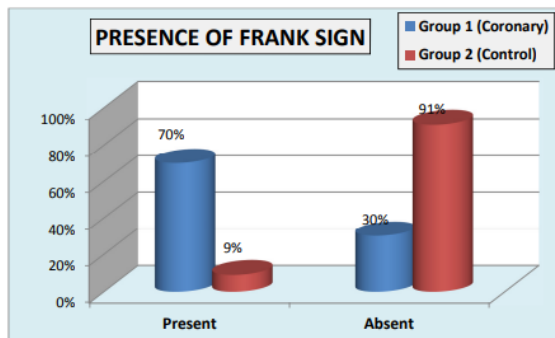


Fig.5 Comparative distribution of presence/absence of Frank sign between Group 1 (Coronary) and Group 2 (Control)

Frank Sign	Present n (%)	Absent n (%)	Chi square test value	p value, Significance
Group 1 (Coronary) (n=100)	70 (70%)	30 (30%)	Chi = 77.853	p<0.001**
Group 2 (Control) (n=100)	9 (9%)	91 (91%)		

*p<0.001 – highly significant difference



DISCUSSION:

Since the first report of DELC by Frank in 1973,[3] various studies have found varying degrees of association between DELC and CHD as reviewed by Friedlander.[4] Several investigations indicated the DELC as a marker of CHD. However, this association still remain disputable due to the confounding effects of age and sex and the different parameters used for diagnosis of CHD. Over the past 35 years there have been a number of published studies that have failed to substantiate the relationship between DELC and CHD. In the 1970s and 1980s, it was postulated that DELC and CHD exist concurrently because the earlobe and heart are supplied by “end arteries” without the possibility for collateral circulation. [5]Others suggested that the generalized loss and degeneration of elastic fibers seen in biopsy specimens taken from the earlobes of patients affected with CHD reflected the microvascular disease that was also present in the coronary bed.[6]The current study showed that the prevalence of DELC was high in patients with CHD (70%) compared with controls (30%). In this study I observed the association between DELC and CHD proven with coronary angiography; therefore, clinical criteria for the diagnosis of CHD were not used. Study outcome denotes that the prevalence of DELC and CHD increases with increasing age.[6]

Limitation of the study : We would like to state that with solely one ethnic population, relatively small sample size, and single center design in this study, the result may not be generalized. Therefore, we suggest more longitudinal studies on large samples in both academic and nonacademic hospitals. Furthermore, there is no information provided about the extent and severity of coronary disease.

Conclusion: The majority of the medical literature supports the association between DELC and CHD; however, in this article, we have also given voice to some research findings. We observed a significantly increased prevalence of DELC in patients with CHD regardless of the other coronary risk factors. DELC might be an independent variable for CHD, and the prevalence of DELC and CHD increases with advancing age. We also observed that DELC was significantly correlated with the major coronary risk factors. We believe that this easily detectable sign could be useful in dental practice, helping the dental surgeon to add new and valuable information to the patient's risk profile.

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