Predictive strength of classical risk factors of coronary artery disease among pre-menopausal females in Punjab

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Abstract

This is a retrospective cross-sectional study with both descriptive and analytic components of Coronary Artery Disease. 198 female patients, who were presented first time for coronary angiography at the Punjab Institute of Cardiology, were included in the sample. The mean age was 50.69 ± 9.09 among female patients. Logistic regression model was fitted to predict the Coronary Artery Disease with the help of significant risk factors and the odds ratios were computed for each significant risk factor. Diabetes Mellitus was the only significant risk factor among the pre-menopausal females. While Age, Diabetes Mellitus, and Lipids are resulted as significant risk factors associated with Coronary Artery Disease among post-menopausal female.

Keywords: Logistic Regression, Odds Ratio, Wald's test.

1. Introduction

Soldo and Mantom (1985) found that Coronary Artery Disease (CAD) is the leading cause of death and disability in western world and claim more lives than death due to cancer, accidents, and diabetes combined Identification of these patients is essential because 40% of all coronary events are fatal. Kannel, W.B. and Abbott, R.D (1987) found that especially in females the coronary events are fatal and 67% of all sudden deaths in females occur in those who have no prior history of CAD. Bhopal (2002) found that the clinical experience suggests that situation is not different in South Asian countries including Pakistan. For any given level of risk factors, the CAD risk among Asian is at least double than of Whites.

Given this dismal outlook, diagnosis of CAD should be actively pursued in females presenting with symptoms of CAD. Evaluation of chest pain characteristics and risk factor profile is the critical first step in the care of these patients. Nature of chest pain experience by a female is of particular importance (Birdwell, B.G., Herbers, J.E., and Kronde, K. 1993).

Major risk factors that can be changed are: (Smith, J.F. 2002)

- Smoking--.
- High cholesterol, High blood pressure, Lack of physical activity, Diabetes mellitus-- **Contributing Risk Factors**

Contributing risk factors have been linked to coronary artery disease, but their significance is not known yet. Contributing risk factors are:

- Obesity,

Buchtal, S.D. et. al. studied the chest pain in women but normal angiogram. They enrolled 35 women who were hospitalized for chest pain but who had no angiographically significant for CAD.

Herrington, D.M. et. al. (2000) studied the effects of estrogen replacement on the progression of CAD in females. It was observed that hormonal replacement does not affect the progression of CAD in females with established disease.

Nabulsi, A.A. et. al. (1993) studied the association of hormonal replacement therapy with various cardiovascular risk factors in postmenopausal females. No significant differences were found.

Avsar, A. et. Al. (1998) assessed the predictive and discriminative value of clinical risk factors of CAD. Product moment correlation coefficients were computed to find the correlation between variables.

Haq, H. and Kiyani, A.M. (1999) studied the prevalence of hyperlipidemia in patients suffering from CAD. A time based sample of 540 patients attending the OPD of cardiac centre of CMH Multan was included in the study. The average age at which CAD occurred in this sample was 48 years.

Nancy, J.V and Bohannon, M.D (1999) high prevalence of large-vessel coronary artery disease (CAD) in diabetic patients is well recognized, but the magnitude of this problem is not always appreciated. Data from the 18-year Framingham Study (1) show that the relative risk for CAD in diabetic men and women 45 to 74 years of age is 2.4 and 5.1 times greater, respectively, than for age-matched nondiabetic men and women. In the Islington Diabetes Survey (2), the prevalence of serious CAD increased from 9% in subjects with normal glucose tolerance to 17% in those with impaired glucose tolerance and 20% in those with diabetes.

2. Methods and Materials

A hospital based cross-sectional 198 (51 pre-menopausal and 147 postmenopausal) indoor female patients were included in the sample after their consent. The research design was ex-post facto research. The patients with known history of CAD were excluded from the study. The logistic regression was used to develop a predictive model for the diagnosis of CAD with the help of

significant risk factors. The odds ratios were computed to assess the degree of dependence of CAD on the classical risk factors.

The data were collected on Age, Chest pain, Diabetes Mellitus, Hypertension, Estrogen Hormonal status, Lipoproteins, Obesity, Life-style, Family History, Socio-economic class, Peripheral Vascular Disease, Stroke, Intermittent Claudication, Carotid/ Renal Bruit. CAD was diagnosed with the help of coronary angiography.

3. Results

There was a significant association between CAD and Estrogen hormonal status (Chi-square = 4.1170, p-value = 0.0420 <0.05). In order to compare the female patients on the basis of Estrogen hormonal status, the analysis was made for the two groups i.e. pre-menopausal and post-menopausal, separately.

The association of every possible risk factor is tested with CAD in pre-menopausal female patients with the help of Chi-square test. The results are shown in Table-1 below.

Table 1:

Risk Factor	Chi-square value	d.f	p-value
Chest Pain	0.1030	1	0.7480
Diabetes Mellitus	12.1210	1	0.0000 **
Hypertension	2.1140	1	0.1460
Lipids	1.6400	1	0.2000
Obesity	0.6150	1	0.4330
Lifestyle	0.7060	1	0.4010
Family History	0.3050	1	0.5810
Socio-economic	1.1111	2	0.5740
class	1.7180	1	0.1900
Stroke			

   * p-value < 0.05, ** p-value < 0.01

Diabetes Mellitus was found to be the only and highly significant risk factor among the pre-menopausal female patients. All other risk factors were found to be non-significant.

To determine the predictive strength of risk factors associated with CAD, the odds ratios are computation. The results are shown in Table-2 below.

Table 2:

Risk factor	$\hat{\beta}$	s.e $(\hat{\beta})$	d.f	p-value	Odds Ratio
Diabetes Mellitus	2.6120	0.7710	1	0.0010	13.621
Constant	-1.2850	0.4270	1	0.0030	0.2770

As shown in above Table-2 risk factors Diabetes Mellitus is resulted as significant risk factors associated with CAD. The risk factor Diabetes Mellitus has an odds ratio 13.621 which indicates that a diabetic pre-menopausal female is 13.621 times at more risk for developing CAD as compared to a non-diabetic pre-menopausal female.

4. Conclusion

The results indicate that females are considered at lower risk of coronary artery disease as compared to males. But this protection is in major due to the estrogen, the hormone produced in female body. The post-menopausal females are at risk of coronary artery disease just like males. But this fact may be confounded with the risk factor age.

Moreover the pre-menopausal females are at low risk of coronary artery disease and the diabetes mellitus is the only significant risk factor of coronary artery disease in this group.

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