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Influencing Factors of Retinopathy among the Diabetic and Non-Diabetic Patients – Binary Logistic Regression approach

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Abstract
Retinopathy is a damage caused to the retina of human eyes. The retina would develop lack of the power to reflect the objects of the vision due to development of retinopathy. The literature shows that there is a differential occurrence of retinopathy between diabetic and non diabetic individuals. For these differences, factors such as age, hypertension, serum lipid levels, HbA1C, smoking etc, are documented to be influencing the incidence and the progression of retinopathy. The results of this comparative and descriptive study with a total of 200 persons including 100 diabetic and 100 non diabetic retinopathy patients selected through systematic random sampling among those who were attending Aravind Eye Care Hospital, Puducherry, using Hosmer and Lemeshow tests and binary logistic Regression equation analysis indicate that Diastolic Bp, LDL, gender of the person, duration of hypertension and duration of smoking were identified as the most significant variables.
Keywords: *Diabetic Retinopathy, Risk factors.*

Introduction

Retinopathy is a damage caused to the retina of human eyes. The retina would develop lack of the power to reflect the objects of the vision due to development of retinopathy. The progression of retinopathy could ultimately end the loss of vision of the affected individuals. If proper preventive and remedial measures are not taken by the concerned person, the result will be the total loss of eye sight. It is well documented that, there is a differential occurrence of this condition, between diabetic and non diabetic individuals. Many factors such as age, hypertension, serum lipid levels, HbA1C, smoking etc, are documented to be influencing the incidence and the progression of retinopathy. Aiming estimation of these factors using statistical models, a study has been carried out to identify those variables contributing to the incidence of retinopathy among diabetic and non diabetic retinopathy patients.

Objective

To assess the known risk factors between diabetic retinopathy and non- diabetic retinopathy patients using Binary Logistic Regression statistical models.

Methods and Materials

It is a comparative and descriptive study. A total of 200 persons including 100 diabetic and 100 non diabetic retinopathy patients were selected through systematic random sampling among those who were attending Aravind Eye Care Hospital, Puducherry. The data collection has been carried

out for a period of 3 months between January and March 2012. Data collection includes the independent variables such as age, status and duration of hypertension, systolic and diastolic BP levels, HDL, LDL Triglycerides, total cholesterol, smoking duration, duration of alcohol consumption and family history and retinopathy as dependent one. Age is coded as1 for < 50 years and 2 for 51 to 60 years and 3 for > 60 years .Systolic and Diastolic Bp are coded as 1 for risk and 0 for Normal. Similarly all the other independent variables are coded. To compare the occurrence of the status of retinopathy between the diabetic and non diabetic subjects, Hosmer and Lemeshow test were applied. Since the 'p' value > 0.05 (Table no: 1)of the chi-squaretests were not significant indicate that the model is good fit for the Binary logistic Regression equation analysis. Hence, on knowing the retinopathy status among the study subjects, for assessing the variations as to the factors influencing among them, Binary Logistic Regression equation analysis were carried out.

Results and Discussion

Table No 1: Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	5.445	8	.709

Table No 2 Binary Logistic Regression model and the risk factors of diabetic Retinopathy compare to the non-diabetic retinopathy.

Variable	B	S.E	Sig.	Exp(B)	95% C.I.for EXP(B)	
					Lower	Upper
Age(x_1)	-.818	.474	.084	.441	.174	1.117
Systolic BP(x_2)	.606	.465	.192	1.834	.737	4.565
Diastolic BP(x_3)	1.273	.466	.006	3.572	1.433	8.903
Triglycerides(x_4)	.361	.369	.328	1.435	.696	2.959
HDL(x_5)	-.459	.487	.347	.632	.243	1.643
LDL(x_6)	3.677	1.312	.005	39.541	3.023	517.207
Total Cholesterol(x_7)	-.677	.392	.085	.508	.236	1.097
Creatinine(x_8)	.127	.378	.737	1.136	.541	2.384
Sex(x_9)	-1.716	.528	.001	.180	.064	.506
Hypertension Duration(x_{10})	2.471	.597	.000	11.832	3.671	38.128
Smoking Duration(x_{11})	1.796	.607	.003	6.026	1.835	19.790
Alcohol Duration(x_{12})	-.599	.540	.268	.550	.191	1.585
Family history (x_{13})	.267	.389	.493	1.306	.609	2.798

By the computation of Binary Logistic regression model, among the 13 variables studied, Diastolic Bp, LDL, gender of the person, duration of hypertension and duration of smoking were identified as the most significant variables.

Conclusion

It is concluded that the independent variables namely diastolic BP, LDL, sex, duration of hypertension and duration of smoking have significant effect in the occurrence of retinopathy among the subjects in relation to their diabetic status. Therefore, among all the influencing variables studied and the literature indicates as well, the occurrence of Retinopathy has been found to be different and by preventing and having control over the influencing factors, individuals with diabetes may get benefitted.

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