Is there an Association Between Coronary Heart Diseases and Diabetes Mellitus?

Introduction

The Framingham Heart Study (FHS) is a historical cohort study that identified risk factors for cardiovascular disease. Diabetes mellitus is a known risk factor for many other health outcomes such as, kidney disease, nerve damage, vision and hearing problems, and infections on the feet that can lead to amputation. The purpose of this study is to determine if there is a relationship between coronary heart disease (CHD) and diabetes mellitus.We hypothesize that there is an association between the two variables. We will test the claim, or null hypothesis that coronary heart disease is independent of diabetes.

Methods

A simple random sample (SRS) of n=500 was generated using Statistical Analysis Systems (SAS) software from the original Framingham Heart Study Data. The sample data shown are frequency counts. The expected frequencies, shown in Table 1, are not all at least 5. A hypothesis test of independence was conducted between the variables CHD and diabetes. Because not all expected frequencies are at least 5, a Fisher's Exact Test was automatically performed by SAS software to determine if CHD is independent of diabetes. The statistical assumption of the expected frequency </= 5 has been met for the Fisher's Exact Test.

Graphs/Tables

Table 1. Table of CHD by diabetes

CHD	diabetes		
	Yes	No	Total
Yes Frequency Expected	7 3.154	76 79.846	83
No Frequency Expected	12 15.846	405 401.15	417
Total	19	481	500

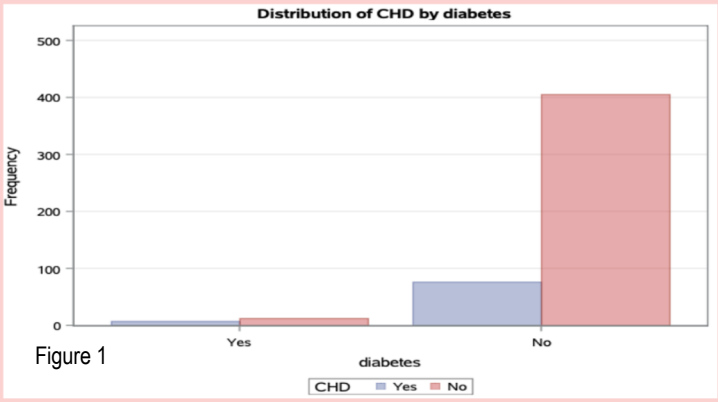

Figure 1

Table 2. Fisher's Exact Test

Cell (1,1) Frequency (F)	7
Left-sided Pr <= F	0.9934
Right-sided Pr >= F	0.0250
Table Probability (P)	0.0184
Two-sided Pr <= P	0.0250

Key Findings/Conclusion/Concepts from Course

The observed frequencies of CHD and diabetes shown in Table 1, and the display of those frequencies in Figure 1 provide a visual representation of the distribution of CHD by diabetes. There are 405 observations of subjects not having CHD and not having diabetes. Seven observations of subjects having both CHD and diabetes. The Fisher's test statistic, shown in Table 2, is F=7 and p-value=0.0250. We reject the null hypothesis that claims that CHD is independent of diabetes. We conclude that there is a statistically significant association between diabetes and CHD at the 0.05 significance level.

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Data Sources: Framingham Heart Study dataset provided in SAS Studio