

Study on the Influencing Factors of Heart Disease

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Abstract. With the continuous development of technology and scientific research, people are constantly exploring the mysteries of the universe and human. Since ancient times, most people have died under various incurable diseases, which has led to a need for more knowledge about diseases to help humans resist diseases and help people explore the world to the next level. According to years of data statistics, cardiovascular and cerebrovascular diseases are one of the diseases with the highest mortality rate, and heart disease is included in it. According to statistics, around 695000 people died from heart disease in 2021, which is an extremely large number, so this paper needs to conduct research on heart disease more. This experiment aims to identify and analyze data related to heart disease, as well as use correlation methods to discover the impact of different factors that contribute to heart disease. By doing so, experimental results can be obtained and conclusions can be drawn regarding the research topic. Through experimental results, it can help people understand the different degrees of influence of the causative factors of heart disease on heart disease, maintain good lifestyle habits in daily life, and provide some tips and assistance for medical treatment. And this experiment can provide some reference for future research on heart disease and contribute to the development of drugs and medical technology.

Keywords: Heart disease, pathogenic factors, correlation coefficient.

1. Introduction

With the development of society and technology, the global medical level is constantly improving, but it is not enough to support people's resistance to all diseases. According to the 2019 Global Health Assessment report, heart disease is one of the top ten diseases with the highest mortality rates, accounting for 16% of current deaths [1]. Since 2000, the number of deaths from heart disease has increased by over 2 million [2]. In the past two decades, the number of deaths due to heart disease has shown an overall trend of first decreasing and then increasing [3]. Moreover, the mortality rate of congenital heart disease is extremely high, because the organs in infants or children are not fully developed. Because of congenital heart disease, patients do not have high resistance, so the mortality rate is high [4]. Therefore, people need to investigate and understand the different causes and potential triggering factors of heart disease and take corresponding treatment measures in a timely manner. This can help people reduce the probability of developing heart disease and take measures to cope with the disease, as well as alleviate the medical burden.

The main causes of heart disease can be divided into two categories. The first is congenital heart disease, which can be caused by genetic and non-genetic factors [5]. Congenital heart disease refers to abnormal cardiac performance caused by abnormal cardiovascular development during embryonic

development in humans. Genetic factors, in short, refer to genes related to heart disease in family genes, while non genetic factors mainly include maternal factors, external environmental factors, etc. (pregnancy infections, gestational age, use or exposure to drugs, tobacco, alcohol, chemicals, working in a strong radiation environment, noisy working environment, exposure to toxic chemicals, passive smoking, heavy metal exposure, etc.), all of which can lead to heart disease in newborns [6]. Statistical and other techniques can be used to study the degree of relationship between these factors and heart disease.

Another type of heart disease is acquired heart disease, which refers to the heart disease that patients suffer from childbirth [7]. The main factor is that the body is induced to develop diseases by internal or external factors, and most of them are caused by poor lifestyle habits that lead to a decline in various aspects of the body's performance, thus affecting the adverse condition of the heart. The experimental results on the birth cohort effect of ischemic heart disease attributed to high salt diet in China from 1990 to 2019 showed that inducing heart disease due to high salt diet was the top factor among many, and the mortality rate caused by high salt diet in China increased with age, and the higher the age, the higher the Risk multiplier of mortality rate [8]. Not only high salt diet, there are more reason can cause acquired heart disease, for example: drinking, high MBI, low temperature, etc. [9]. Statistics show that the risk of mortality increases significantly among the population aged 60-64 to 80-84. Older people also have a weakened immune system, and most of the people who die from IHD are over 70 years old [10]. And according to the research data, women have a 3% higher rate of acquired heart disease than men, but death is lower than men. Therefore, both men and women should pay more attention to their daily routines and dietary habits to reduce the probability of developing heart disease. Therefore, to sum up, this article will go through various experimental investigations and analyse the data. The mortality rate of heart disease caused by different causes. Through this survey and research, people can know more about heart disease and give people some medical and health tips.

2. Methods

2.1. Data Source

The data for this literature comes from the Kaggle website, which conducted exploratory data analysis and machine learning modeling on heart disease prediction by Rashad Mammadov and was published and updated for one person a month ago.

Table 1. List of variables

variables	type	range
cholesterol	The total cholesterol content of various lipoproteins in the blood	150-349
blood pressure	The lateral pressure exerted on a unit area of the vessel wall by blood flowing within the vessel	90-179
heart rate	The number of beats per minute of the human heart	60-99
smoking	Smoking Status	Never/Currently/Other
alcohol intake	The energy of ingested alcohol	Heavy/None/Other
exercise time	Daily exercise volume	0-9
family history	Does the family have a history of heart disease	true/false

The data used in this article consists of a total of 1000 people, with half being male and half being female (Table 1). The age of the patients ranges from 25 to 79 years old. In this data, other eight variables (cholesterol, blood pressure, heart rate, smoking, alcohol intake, exercise time, family history, diabetes) are also included.

2.2. Method Introduction

Taking heart disease as an example, in order to observe the relationship between the dependent variable and the independent variable and draw conclusions, this article needs to use a probability regression model, the probability of having heart disease (Y), eight independent variables (X), and observe the influence of X on Y through data analysis to determine the relationship between eight different factors and the probability of developing heart disease. Among them, logistic regression models were also applied [10].

3. Results and Discussion

3.1. Correlation Analysis

Correlation analysis refers to the correlation between a dependent variable and multiple independent variables. In this study experiment, the correlation between heart disease and multiple disease factors is investigated, as shown in figure 1, figure 2 and so on.

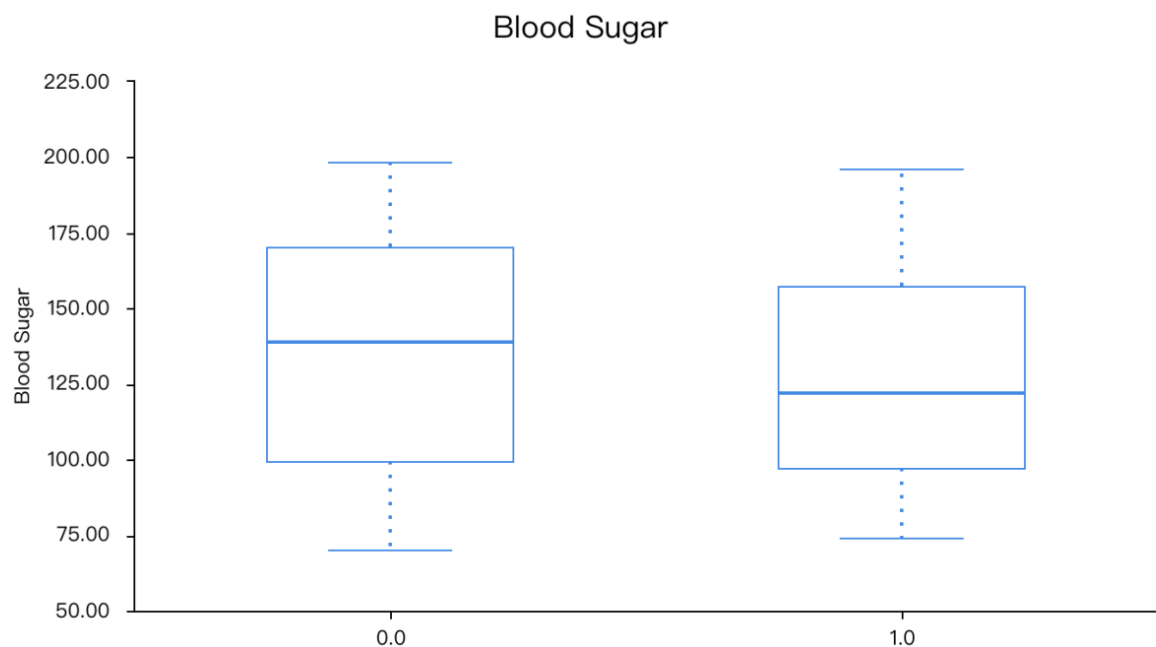


Figure 1. Box plot of blood glucose factors and heart disease causes

Figure 1 is a boxplot showing the relationship between blood glucose factors and heart disease. This data shows the maximum, minimum, median, and other values related to blood glucose factors and heart disease, such as a maximum value of 200.00 and a minimum value of approximately 75.00. By using this data, the author can determine the impact of blood sugar as a factor on the development of heart disease.

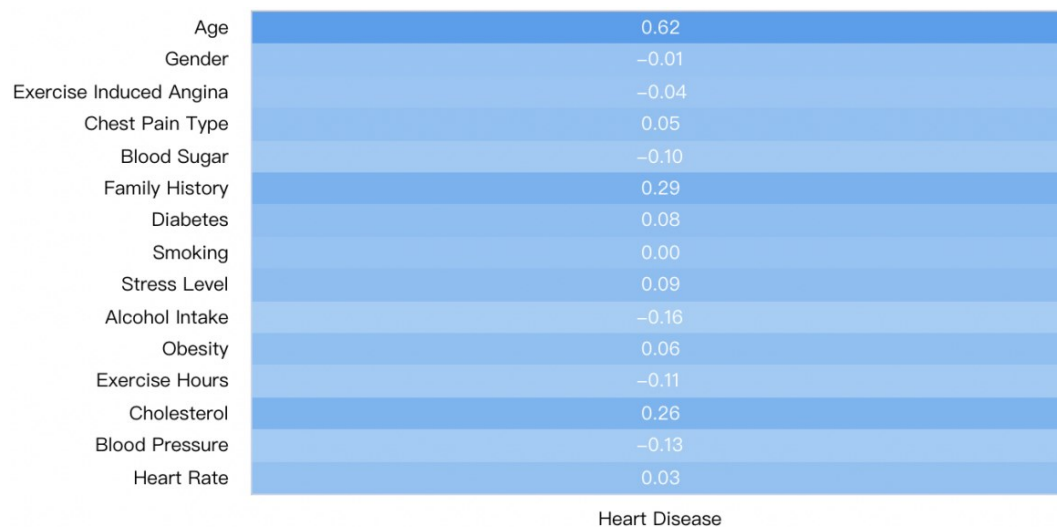


Figure 2. The correlation between heart disease and various factors

The correlation coefficient between factors affecting heart disease and heart disease can be obtained from figure 2. From research data, it has been found that factors such as gender, exercise-induced angina, blood glucose, alcohol intake, exercise duration, and blood pressure are positively correlated with heart disease. Other factors are negatively related to heart disease, such as grade, family history, diabetes, stress level, etc. Among them, smoking is not related to heart disease. In summary, all factors can affect whether one develops heart disease, except for smoking.

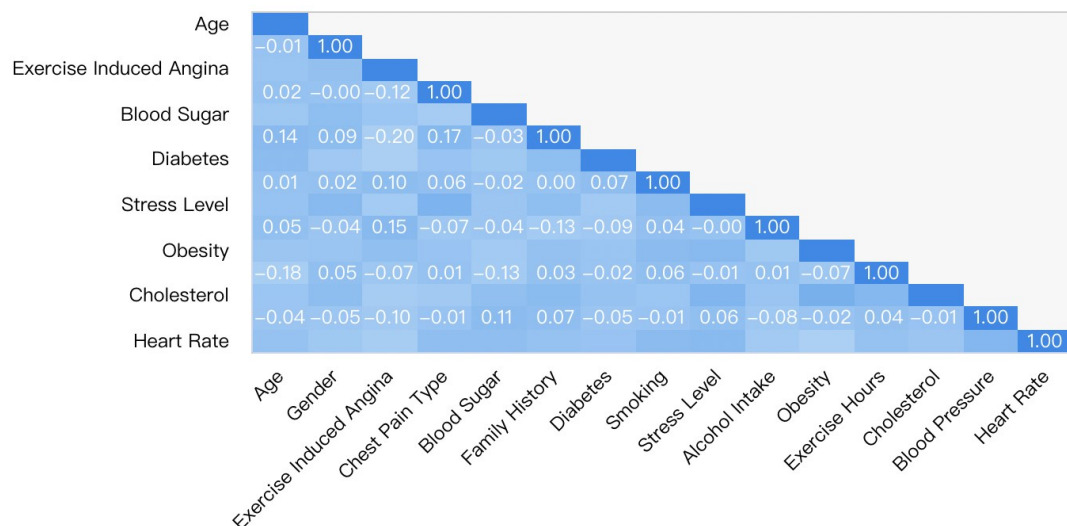


Figure 3. The correlation between various factors

In figure 3, the data shows the correlation between various factors. From this, the degree of influence between a certain factor and another factor can be determined, such as the negative correlation between age and heart rate, and the positive correlation between obesity, etc., from which the correlation between different factors can be obtained.

3.2. Logistic Model Results

From table 2, it can be seen that age and cholesterol have a significant positive impact on heart disease, while other factors do not have an impact on heart disease. From the chart, it can be seen that the

regression coefficient of age is 0.212 and shows a significance level of 0.01, indicating that age has a significant positive impact on heart disease. Its odds ratio is 1.236, which means that when age increases by one unit, the change in heart disease is 1.236 times. The regression coefficient value of cholesterol is 0.037, and it shows significance at the 0.01 level, indicating a positive relationship between cholesterol and heart disease. Its odds ratio is 1.038, which means that when cholesterol increases by one unit, the change in heart disease is 1.038 times.

Table 2. Binary logistic regression model of heart disease and various factors

Items	Coefficient	S.E.	z value	Wald	p
Gender	0.200	0.222	0.900	0.810	0.368
Exercise Hours	0.013	0.038	0.343	0.118	0.732
Family history	0.247	0.223	1.109	1.230	0.267
Exercise Induced Angina	0.090	0.226	0.401	0.161	0.688
Chest Pain Type	0.056	0.102	0.551	0.304	0.582
Blood Pressure	0.000	0.004	0.021	0.000	0.983
Age	0.212	0.014	14.728	216.901	0.000
Cholesterol	0.037	0.003	12.402	153.809	0.000
Diabetes	0.238	0.225	1.057	1.116	0.291
Blood Sugar	0.001	0.003	0.185	0.034	0.853
Smoking	-0.019	0.135	-0.144	0.021	0.885
Obesity	-0.058	0.222	-0.261	0.068	.0794
Alcohol Intake	-0.073	0.137	-0.535	0.286	0.593
Heart Rate	0.004	0.010	0.405	0.164	0.685
Stress Level	0.004	0.040	0.105	0.011	0.916
Constant	-23.092	2.109	-10.951	119.931	0.000

4. Conclusion

By analyzing and studying various data and using multiple methods (such as studying the relationship between dependent and independent variables, the relationship between various dependent variables, etc.), as well as inferring the correlation between various data, the results of the topic that needs to be studied were finally obtained: the influence of different factors that cause diseases on the development of heart disease.

It must be noted that due to the large amount of data on factors that can cause heart disease and the limited sample size of the population that can be investigated, and the fact that the sample data I studied cannot cover all disease factors and different types of populations, there is a certain degree of bias and low accuracy in the experimental conclusions. But it must be acknowledged that research on the impact of different factors that trigger heart disease on the development of heart disease is a very valuable study. Firstly, through the icons and data presented in this study, the degree of correlation between various factors and heart disease can be intuitively perceived, allowing for a clear understanding of the probability of different causes leading to heart disease. This enables the study to present its findings in a straightforward manner. The second point is that this study used various methods, such as box plots, correlation data, etc., which can use the presentation of data to present the research results more clearly and intuitively. Third, this experimental result can help people understand knowledge about heart disease, such as how the onset of heart disease is related to various causes (cholesterol, blood sugar, blood pressure, family history, etc.). This result can provide assistance in medical treatment for heart disease and also help people who have not suffered from heart disease understand knowledge about heart disease, and take preventive and coping measures. Finally, the data from this experiment can assist the latter in referencing and analyzing relevant experiments, contributing to future experiments on the topic of heart disease and advancing the development of disease-related reports and research.

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