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Research Article

Mathematical Analysis of the Healthcare Treatment of 215 Patients with Coronary Heart Disease

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The main risk factors for CHD and the comorbidity include hyperlipidemia (HL), hypertension, smoking, dietary factors, and genetic factors. In this work, 215 patients with coronary heart disease, including 128 males and 87 females, were analyzed for a better understanding of the related clinical pharmacology. Nonparametric test, analysis of variance, chi-square test, correlation analysis, and other methods were used to sort out the data. From the analysis, there are significant differences in age among different gender samples. The incidence of coronary heart disease in men is five years younger than that in women. The sample pairs from different regions showed differences in the presence of family history of diabetes, indicating that a series of patients in some regions concentrated on the disease status of family history of diabetes. Age has a significant positive effect on cardiac functional classification. The older you are, the larger the cardiac functional classification is and the worse the cardiac function is. Age was negatively correlated with VTE score, diastolic blood pressure, CAR, TG, neutrophil, and TC. The older you are, the lower these six values are. Samples of different types of CHD showed significant differences in the presence of comorbidity and family history of CHD. The most significant are unstable angina pectoris and ischemic cardiomyopathy. Samples of different CHD types showed significant effects on VTE score, creatine kinase, low-density lipoprotein cholesterol (LDL-C), and lactate dehydrogenase. The highest lactate dehydrogenase is ischemic cardiomyopathy. The highest LDL cholesterol is ST-segment elevation angina. The highest creatine kinase is ischemic cardiomyopathy. The VTE score was the highest for ischemic cardiomyopathy, followed by non-ST-segment elevation angina. Samples taken with or without lipid-lowering drugs showed significant differences in lactate dehydrogenase, creatinine, and TC. There was a significant positive correlation between VTE scores and lactate dehydrogenase, myoglobin, and creatine kinase. High VTE score indicates high lactate dehydrogenase, myoglobin, and creatine kinase. TC has a significant positive correlation with HDL-C and TG, respectively. Higher TC values indicate higher HDL-C and TG values.

1. Introduction

Cardiovascular disease accounts for 31% of all deaths worldwide each year, more than any other cause of death [1–3]. Coronary heart disease is the most common heart disease among cardiovascular diseases. It is a heart disease caused by stenosis or occlusion of the lumen caused by coronary atherosclerosis, which leads to myocardial ischemia, hypoxia, or necrosis, and has become one of the major diseases that seriously affect people's health and

Table 1: Results of nonparametric test analysis of gender for age, height, and weight.

	Gender (median) Female ($n = 87$)	Male ($n = 128$)	Mann–Whitney test statistic u value	Mann–Whitney test statistic z value	p
Age	69.000	65.000	3858.500	-3.821	<0.01∗∗
Height (cm)	155.000	166.000	682.000	-10.604	<0.01∗∗
Body weight (kg)	57.000	66.500	1794.500	-7.845	<0.01∗∗

$*p < 0.05$and $**p < 0.01$.

threaten human life [4]. The main pathogenic factors of coronary heart disease include hyperlipidemia (HL), hypertension, smoking, dietary factors, and genetic factors [5]. The prevention and treatment of coronary heart disease has become a top priority in modern medicine. SPSS data analysis is widely used in the study of coronary heart disease, of which the clinical management and care of coronary heart disease is considered to be the focus of research analysis; data analysis has become the mainstream of retrospective study [6–9].

Some studies have analyzed the influencing factors and comorbidity of coronary heart disease [10–15]. There are also some studies on the treatment methods of coronary heart disease, and some effective conclusions have been drawn, which provide some theoretical and practical basis for the prevention and treatment of coronary heart disease [16–20]. According to the existing research, we found that the above research results lack the data related to clinical nursing, and the relationship between the indexes of coronary heart disease needs further discussion. Coronary heart disease is related to harmful consequences. Patients often complain about the decline of physical ability, stress and depression, decline of quality of life, and fear of recurrence of heart or other diseases [21]. Some studies have investigated the causes of coronary heart disease and the inducement of comorbidity. Studies have found that there are many causes of coronary heart disease, and more indicators can also induce comorbidity, such as diabetes [22–25]. Studies have found that patients with coronary heart disease with diabetes have a higher mortality rate than those without diabetes, which greatly increases the burden of medical care [26, 27]. Therefore, while treating coronary heart disease, preventing and reducing comorbidity will help to improve patients' quality of life.

In order to solve the above problems, we collected and analyzed various indicators of patients with coronary heart disease, aiming to understand the indicators of coronary heart disease and the relationship between various indicators, and provided a theoretical basis for the later treatment. This study analyzed 215 patients with coronary heart disease, including 128 males and 87 females. Nonparametric test, analysis of variance, chi-square test, correlation analysis, and other methods were used to sort out the data. This will help to enrich the research status of coronary heart disease, supplement the data of various indicators of patients with coronary heart disease, and provide the basis for the development of treatment options in the future.

Table 2: Analysis of variance results of gender and age.

	Gender (mean standard deviation) Female ($n = 87$)	Male ($n = 128$)	F	p
Age	68.37 ± 9.17	63.12 ± 10.54	14.256	<0.01∗∗

$*p < 0.05$ and $**p < 0.01$.

2. Methods

A total of 215 patients admitted to the hospital were selected as the research object. There were 128 males and 87 females, aged 32-94 years old. Methods SPSS 23.0 software was used to analyze the experimental data of gender, age, and VTE score. Single factor analysis of variance, chi-square test, and linear regression analysis were used.

3. Results

As shown in Table 1, nonparametric test was used to analyze the differences of gender in age, height (cm), and weight (kg). From Table 1, it can be seen that gender consists of men and women, respectively, so Mann–Whitney test statistic was used to analyze it. The samples from different genders showed significant differences in age, height (cm), and weight (kg) ($p < 0.01$). The average age, height, and weight at the hospital for men and women were significantly different.

From Table 2, we can find that the one-way analysis of variance (ANOVA) is used to study the differences between gender and age. From Table 2, we can see that the samples of different gender have significant differences in age ($p < 0.01$). The mean age at admission was 68 years for females, 63 years for males, and older for females with the disease. This indicates that in this sample, the incidence of coronary heart disease was five years younger in men than in women.

As shown in Table 3, the chi-square test (cross-analysis) was used to analyze the difference between regions on the existence of family history of coronary heart disease, diabetes mellitus, and gestational diabetes mellitus. As shown in Table 3, samples from different regions showed no significant differences in family history of coronary heart disease and gestational diabetes mellitus ($p > 0.05$). However, the samples from different regions showed a significant effect on the family history of diabetes ($p < 0.05$), indicating that a series of patients in some regions concentrated on the disease status with the family history of diabetes.

Table 3: Analysis results of chi-square test on region and family history of coronary heart disease, diabetes, and gestational diabetes mellitus.

Subject	Name	Region (%)		Amount to	χ^2	p
		Village	City			
Family history of coronary heart disease	No	64 (74.42)	77 (59.69)	141 (65.58)	5.498	0.064
	Yes	7 (8.14)	12 (9.30)	19 (8.84)		
	Unknown	15 (17.44)	40 (31.01)	55 (25.58)		
Amount to		86	129	215		
Any family history of diabetes	No	65 (75.58)	70 (54.26)	135 (62.79)	10.113	0.006**
	Yes	6 (6.98)	19 (14.73)	25 (11.63)		
	Unknown	15 (17.44)	40 (31.01)	55 (25.58)		
Amount to		86	129	215		
Any history of gestational diabetes mellitus	No	34 (39.53)	52 (40.31)	86 (40.00)	0.013	0.910
	Unknown	52 (60.47)	77 (59.69)	129 (60.00)		
Amount to		86	129	215		

$*p < 0.05$ and $**p < 0.01$.

Table 4: Results of linear regression analysis between age and performance grade ($n = 215$).

	Nonstandardized coefficient		Normalization coefficient	t	p	VIF	R^2	Adjust r	F
	B	Standard error	*Beta*						
Constant	0.564	0.362	—	1.557	0.121	—	0.080	0.076	$F(1213) = 18.606$, $p < 0.01$
Age	0.024	0.005	0.283	4.313	<0.001**	1.000			

Dependent variable: cardiac function classification. D-W value: 1.821. $*p < 0.05$ and $**p < 0.01$.

As shown in Table 4, age (independent variable) and cardiac function classification (dependent variable) were analyzed by linear regression analysis. It can be seen from Table 4 that the regression coefficient value of age was 0.024 ($t = 4.313$, $p < 0.01$), indicating that age had a significant positive effect on cardiac function classification. The older you are, the larger the cardiac function grade will be and the worse your cardiac function will be.

As shown in Table 5, correlation analysis was used to study the correlation between age and VTE score, diastolic blood pressure (the first time of admission), albumin (CAR), triglyceride (TG), neutrophil, and cholesterol (TC). Pearson correlation coefficient was used to indicate the strength of the correlation. According to the correlation coefficient and p value in Table 5, there is a negative correlation between age and the six items. This indicates that in this sample, the values of VTE score, diastolic blood pressure (first admission), albumin (CAR), triglyceride (TG), neutrophil, and cholesterol (TC) were lower with the age.

As shown in Table 6, the chi-square test (cross-analysis) was used to analyze the difference between the pairs of CHD types in the presence of comorbidity and the family history of CHD. As shown in Table 5, the samples of different CHD types showed significant differences in the presence of comorbidity and the family history of CHD ($p < 0.05$), indicating that the pairs of samples of different CHD types showed significant differences in the presence of comorbidity and the family history of CHD. The most significant are unstable angina pectoris and ischemic cardiomyopathy. They basically have comorbidity and generally have no family history of coronary heart disease.

As shown in Table 7, the differences of VTE score, creatine kinase, low-density lipoprotein cholesterol (LDLC), and lactate dehydrogenase among the samples of different coronary heart disease types were investigated using analysis of variance (one-way ANOVA). As shown in Table 7, the VTE score, creatine kinase, low-density lipoprotein cholesterol (LDLC), and lactate dehydrogenase of samples of different coronary heart disease types were all significantly different ($p < 0.05$). As can be seen from the table, the LDH was the highest in ischemic cardiomyopathy. The highest LDL cholesterol is ST-segment elevation angina. The highest creatine kinase is ischemic cardiomyopathy. The VTE score was the highest for ischemic cardiomyopathy, followed by non-ST-segment elevation angina.

Table 8 shows that the application of analysis of variance (all known as one-way analysis of variance) to study whether the use of lipid-lowering drugs for lactate dehydrogenase, creatinine, and cholesterol (TC) has differences can be seen: different samples of whether to take lipid-lowering drugs for lactate dehydrogenase, creatinine, and cholesterol (TC) showed significant ($p < 0.05$), indicating that different samples of whether to take lipid-lowering drugs for lactate dehydrogenase, creatinine, and cholesterol (TC) have significant differences.

As shown in Table 9, correlation analysis was used to study the correlation between VTE scores and lactate dehydrogenase, myoglobin, and creatine kinase, and Pearson correlation coefficient was used to indicate the strength of the

Table 5: Age correlates with Pearson's VTE score, diastolic blood pressure, albumin, triglycerides, neutrophils, and cholesterol.

		Age
VTE score	Correlation coefficient	-0.196**
	p value	0.004
Diastolic pressure (first admission)	Correlation coefficient	-0.299**
	p value	0.01
Albumin (CAR)	Correlation coefficient	-0.256**
	p value	0.01
Triglyceride (TG)	Correlation coefficient	-0.284**
	p value	0.01
Neutrophil	Correlation coefficient	-0.141*
	p value	0.041
Cholesterol (TC)	Correlation coefficient	-0.155*
	p value	0.028

*$p < 0.05$ and **$p < 0.01$.

Table 6: Analysis results of chi-square test of coronary heart disease type pairs for presence of complications and family history of coronary heart disease.

Subject	Name	Coronary heart disease type (%)					Amount to	χ^2	p
		ST-segment elevation angina pectoris	Unstable angina pectoris	Stable angina pectoris	Ischemic cardiomyopathy	Non-ST-segment elevation angina pectoris			
Are there comorbidity	No	1 (100.00)	8 (6.45)	2 (22.22)	7 (12.50)	6 (24.00)	24 (11.16)	16.099	0.003**
	Be	0 (0.00)	116 (93.55)	7 (77.78)	49 (87.50)	19 (76.00)	191 (88.84)		
Amount to		One	124	Nine	Fifty-six	25	215		
Family history of coronary heart disease	No	0 (0.00)	73 (58.87)	5 (55.56)	41 (73.21)	22 (88.00)	141 (65.58)	22.991	0.003**
	Be	1 (100.00)	15 (12.10)	0 (0.00)	3 (5.36)	0 (0.00)	19 (8.84)		
	Unknown	0 (0.00)	36 (29.03)	4 (44.44)	12 (21.43)	3 (12.00)	55 (25.58)		
Amount to		One	124	Nine	Fifty-six	25	215		

*$p < 0.05$ and **$p < 0.01$.

Table 7: Coronary heart disease type and VTE score, creatine kinase, low-density lipoprotein cholesterol, and lactate dehydrogenase analysis of variance results.

	Type of coronary heart disease (mean standard deviation)					F	p
	ST-segment elevation angina pectoris ($N = 1$)	Unstable angina pectoris ($n = 124$)	Stable angina pectoris ($n = 9$)	Ischemic cardiomyopathy ($n = 56$)	Non-ST-segment elevation angina ($n = 25$)		
VTE score	2.00 ± null	1.74 ± 0.62	1.78 ± 0.67	2.27 ± 0.70	2.24 ± 0.78	7.563	0.01**
Creatine kinase	55.80 ± null	114.27 ± 153.05	92.06 ± 65.58	323.73 ± 624.28	168.27 ± 199.57	3.542	0.008**
Low-density lipoprotein cholesterol (LDL-C)	164.00 ± null	2.05 ± 0.82	2.06 ± 1.05	2.29 ± 0.84	2.12 ± 0.91	9163.334	0.01**
Lactate dehydrogenase	146.69 ± null	191.92 ± 54.46	189.38 ± 34.54	296.74 ± 220.29	243.47 ± 80.69	7.104	0.01**

*$p < 0.05$ and **$p < 0.01$.

Table 8: Analysis of variance results between taking lipid-lowering drugs and lactate dehydrogenase, creatinine, and cholesterol.

	Whether to take lipid-lowering drugs (average standard deviation)		F	p
	No ($n = 136$)	Yes ($n = 79$)		
Lactate dehydrogenase	249.35 ± 157.17	184.53 ± 44.23	12.640	0.01∗∗
Creatinine	89.75 ± 93.62	132.10 ± 214.10	3.909	0.049∗
Cholesterol (TC)	4.09 ± 1.06	3.56 ± 0.84	13.655	0.01∗∗

$*p < 0.05$ and $**p < 0.01$.

Table 9: Pearson-related results of VTE score with LDH, myoglobin, and CK.

		VTE score
Lactate dehydrogenase	Correlation coefficient	0.319∗∗
	p value	0.01
Myoglobin	Correlation coefficient	0.215∗∗
	p value	0.002
Creatine kinase	Correlation coefficient	0.205∗∗
	p value	0.003

$*p < 0.05$ and $**p < 0.01$.

Table 10: Pearson correlation results of cholesterol and HDL-cholesterol, triglycerides.

		Cholesterol (TC)
High density lipoprotein cholesterol (HDL-C)	Correlation coefficient	0.531∗∗
	p value	0.01
Triglyceride (TG)	Correlation coefficient	0.483∗∗
	p value	<0.001

$*p < 0.05$ and $**p < 0.01$.

correlation. As shown in Table 9, the VTE scores were significantly correlated with lactate dehydrogenase, myoglobin, and creatine kinase at 0.01 level. Therefore, there was a significant positive correlation between VTE scores and lactate dehydrogenase, myoglobin, and creatine kinase. The higher the VTE score was, the higher the lactate dehydrogenase, myoglobin, and creatine kinase were.

As shown in Table 10, correlation analysis was used to study the correlation between cholesterol (TC) and high-density lipoprotein cholesterol (HDL-C) and triglyceride (TG), and Pearson correlation coefficient was used to indicate the strength of the correlation. From Table 10, it can be seen that cholesterol (TC) and high-density lipoprotein cholesterol (HDLC) and triglyceride (TG) show a significant level of 0.01, thus indicating that cholesterol (TC) and high-density lipoprotein cholesterol (HDLC) and triglyceride (TG) have a significant positive correlation. Higher cholesterol (TC) values indicate higher HDL-C and TG values.

4. Discussion

In this sample, age is negatively correlated with diastolic blood pressure and cholesterol (TC). This is contrary to the consistent conclusion of other researchers [28, 29]. There may be three reasons for this: first is because there are few young people in this study, and their diastolic blood pressure and cholesterol are already in high digits at the time of treatment. Therefore, statistically speaking, there will be a conclusion that diastolic blood pressure and cholesterol decrease with age. The second reason is that the study is a one-time cross-sectional examination of all patients, which does not include the pretest and posttest of the patient's own time course. The third possibility is that the sample case itself is accidental. There are occasional statistical variations in the sampled samples, and the variation of medical data may lead to wrong conclusions [30]. This situation deserves attention and discussion in future research. As reported by Spencer et al. [31], age was negatively correlated with VTE. In the study on VTE, acute myocardial infarction (AMI), and age for young patients, VTE was nearly 4 times related to the risk of subsequent AMI. The risk of AMI was increased in VTE patients aged 20–39, but there was no significant relationship between VTE and AMI in patients aged 40–64. In another study on the correlation between blood pressure and coronary heart disease [32], it was pointed out that diastolic blood pressure increased in parallel from the age of 30 to 49 years old. After 50–60 years old, the diastolic blood pressure drops, which is the same with the conclusion of this study and the age range is also the same. For age and triglycerides reported elsewhere [33], TG, TC, and

AMI onset age were negatively correlated. As reported by Bother et al. [34], age was negatively correlated with neutrophils. For the presence of comorbidity and family history of CHD, some reports have opposite results, possibly due to the lack of data record. For different types of low-density lipoprotein cholesterol in coronary heart disease, reported studies have different results, especially for the acute myocardial infarction. Different types of coronary heart disease HDL-C had statistical differences. Studies have also shown acute myocardial infarction type and stable angina pectoris and unstable angina pectoris LDL-C difference.

5. Conclusions

In this sample

(1) samples of different sexes showed significant differences in age, height, and weight. The average age, height, and weight of men and women admitted to the hospital were different

(2) there are significant differences in age among different gender samples. The incidence of coronary heart disease in men is five years younger than that in women

(3) the sample pairs from different regions showed differences in the presence of family history of diabetes, indicating that a series of patients in some regions concentrated on the disease status of family history of diabetes

(4) age has a significant positive effect on cardiac functional classification. The older you are, the larger the cardiac functional classification is and the worse the cardiac function is

(5) age was negatively correlated with VTE score, diastolic blood pressure (the first time of admission), albumin (CAR), triglyceride (TG), neutrophil, and cholesterol (TC). The older you are, the lower these six values are

(6) samples of different types of CHD showed significant differences in the presence of comorbidity and family history of CHD. The most significant are unstable angina pectoris and ischemic cardiomyopathy. They basically have comorbidity and generally have no family history of coronary heart disease

(7) samples of different CHD types showed significant effects on VTE score, creatine kinase, low-density lipoprotein cholesterol (LDL-C), and lactate dehydrogenase. The highest lactate dehydrogenase is ischemic cardiomyopathy. The highest LDL cholesterol is ST-segment elevation angina. The highest creatine kinase is ischemic cardiomyopathy. The VTE score was the highest for ischemic cardiomyopathy, followed by non-ST-segment elevation angina

(8) samples taken with or without lipid-lowering drugs showed significant differences in lactate dehydrogenase, creatinine, and cholesterol (TC)

(9) there was a significant positive correlation between VTE scores and lactate dehydrogenase, myoglobin, and creatine kinase. High VTE score indicates high lactate dehydrogenase, myoglobin, and creatine kinase

(10) cholesterol (TC) has a significant positive correlation with HDL-C and TG, respectively. Higher cholesterol (TC) values indicate higher HDL-C and TG values

Data Availability

The data used to support the findings of this study are included within the article and the supplementary information file (available here).

Ethical Approval

Ethical approval for this work was obtained from the Ethical Review Committee of Hunan Provincial People's Hospital (The First Affiliated Hospital of Hunan Normal University).

Conflicts of Interest

The authors declare no conflict of interest.

Authors' Contributions

MT contributed to conception and design of the study and wrote the first draft of the manuscript. SS, YQ, and JW contributed to manuscript revision, read, and project management. YC, DL, KT, LL, and SW contribute to the data collection and analysis. All authors approved the submitted version.

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Supplementary Materials

Raw data for the analysis. *(Supplementary Materials)*

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