Correlation Analysis of Blood Lipid Metabolism Level and Liver Malignant Tumor under Information System Medical Health Data

Juan Feng[a] and Yong Feng[b]
Qingdao West Coast New District People's Hospital, Qingdao, Shandong, China

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Abstract: Liver malignant tumor was the fifth most common malignant tumor in the world and the third leading cause of cancer-related death. To explore the relationship between lipid metabolism level and liver malignant tumor, in this paper, 142 patients with liver malignant tumors were selected as the experimental group by the method of obtaining medical and health data through the hospital information system, and 803 health examiners were selected as the control group with the the same period for visting the hosptical, it gave a correlation analysis of the blood lipid detection data of the two groups. The performance of liver malignant tumor includes serum total cholesterol, triglycerides, high-density lipoprotein, low-density lipoprotein, apolipoprotein AI and apolipoprotein B, which were significantly lower than those of healthy people on physical examination. This study verify that the blood lipid metabolism level of patients with liver malignant tumors were significantly lower than that of the normal population with the help of information system medical health data, the blood lipid metabolism level can be used as an important disease evaluation index for the development of liver malignant tumors.

1 INTRODUCTION

Blood lipid was the general term for all lipid components in human blood. Clinical medical tests mainly detect serum total cholesterol (CHO), triglycerides (TG), high-density lipoprotein (HDL-C), low-density lipoprotein cholesterol (LDL), apolipoprotein AI (ApoAI), Apolipoprotein B (ApoB) and other indicators (Adegoke 2020, Adeyanju 2020). The liver was the largest digestive organ of the human body and was closely related to the metabolism of blood lipids in the human body.

Studies have shown that human lipid metabolism disorders were closely related to the occurrence (Sung 2021, NCD-RisC 2020, Yang 2013) and development of cardiovascular diseases and tumors (Seko 2013, Kitahara 2011). At present, the correlation analysis of blood lipid metabolism level and malignant tumors in international literature was based on the research and analysis of small sample size, and there was no literature to extract medical health data through informatization to carry out large sample size analysis (Rimessi 2016, Ahn 2009). In this study, with the help of the hospital's internal information system, after the personal medical information was masked, the blood lipid test data of 803 healthy medical examiners and 142 patients with clearly diagnosed liver malignant tumors in the same period and the same age group were collected. Then carry out two sets of correlation analysis.

In this study, the information system was used to retrieve the original medical and health data, and the SPSS statistical software package was used to analyze the research data. The measurement data was the average value plus or minus the standard deviation to indicate the index of abnormal blood lipid metabolism. Parallel to the analysis of variance, the abnormal blood lipid metabolism was compared between the liver malignant tumor group and the normal physical examination group. The use of information systems to extract medical and health data can effectively reduce statistical errors and improve the accuracy of experimental results. Through analysis, this study clarified that the reduction of blood lipid metabolism can be used as an important indicator of the deterioration of patients

[a] https://orcid.org/0000-0002-7321-7732
[b] https://orcid.org/0000-0002-4515-560X

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with liver malignant tumors, and provides a reference for clinicians to observe the development of patients with liver malignant tumors.

2 MATERIALS AND METHODS

2.1 Research Object

142 cases of liver malignant tumor patients treated in tertiary hospitals from February 2020 to October 2021 were screened with the help of an information system as the experimental group.

2.2 Standard Constrain

Standard constrain: (1) Diagnosed as liver malignant tumor by pathological examination; (2) No history of surgery, radiotherapy and chemotherapy; (3) The patient had the result of fasting blood lipid level in the early morning during hospitalization; (4) The clinical data of the patient was completed.

Exclusion criteria: (1) Combined with abnormal function of other important systems and organs; (2) Combined with other types of malignant tumors; (3) Patients had oral antihypertensive, lipid-lowering, and hypoglycemic drugs; (4) Pregnant or lactating women.

In the experimental group, there were 110 males and 32 females with liver malignant tumors; they were 43 to 90 years old, with an average age of (62.04±8.87) years old.

The control group used the information system to screen out 803 healthy people who came to the hospital for physical examination during the same period. Among them, there were 584 males and 219 females; they were 54 to 71 years old, with an average age of (60.82±4.99) years old.

There was no statistically significant difference in baseline information between the two groups (all P>0.05), and they were comparable. All researches were approved by the hospital ethics committee. The blood test information of all subjects has been masked before being extracted from the information system. All data in this research does not involve personal privacy.

2.3 Method

In the liver malignant tumor group, 3ml of fasting peripheral venous blood was taken in the early morning of hospitalization and delivered to the laboratory Beckman AU5800 automatic biochemical analyzer for unified testing. Reference standards for each test item: total cholesterol: 0-5.17mmol/L, triglycerides: 0-2.3mmol/L, high-density lipoprotein cholesterol: 1.29-1.55mmol/L, low-density lipoprotein cholesterol: 0-3.37 mmol/L, Apolipoprotein AI: 1.0-1.6g/L, Apolipoprotein B: 0.6-1.1g/L.

2.4 Statistical Analysis

The SPSS statistical software package was used to analyze the research data. The measurement data was represented by $\bar{x}\pm s$ parallel analysis of variance or t test, and the count data was represented by n (%) parallel X^2 test. P<0.05 indicated that the difference was statistically significant.

3 RESULT

3.1 Comparison of Baseline Data

Comparison of different genders between the experimental group and the control group. There were 110 males and 32 females in the experimental group; 584 males and 219 females in the control group during the same period. The gender difference between the two groups was not statistically significant (P>0.05). See Table 1 and Figure 1 for details.

Table 1. Comparison of the two groups of different genders.

Group	Male (%)	Female (%)
Liver cancer	110 (77.46)	32 (22.54)
Control	584 (72.73)	219 (27.27)
Chi-square with Yates' correction	1.156	
P-value	0.282	

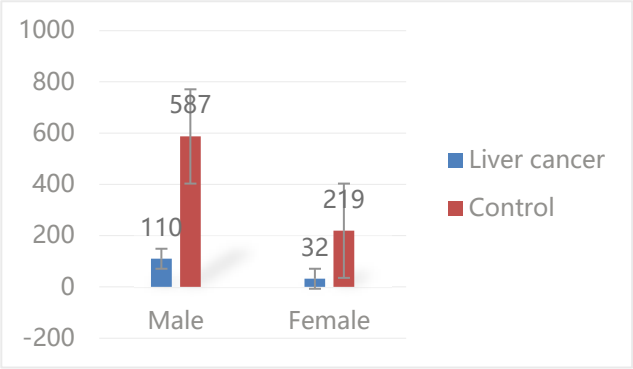

Figure 1: Gender distribution of liver malignant tumor group and healthy population.

3.2 Comparison of Abnormal Blood Lipid Metabolism of Different Genders

Serum total cholesterol (CHO) ≥ 5.17mmol/L in the experimental group was abnormal, with 18 males (60%) and 12 females (40%); Triglyceride (TG) ≥ 2.3mmol/L was abnormal, 5 males (62.5%), 3 females (37.5%); high-density lipoprotein (HDL-C) ≤ 1.29mmol/L was abnormal, 81 males (82.65%), 17 cases (17.35%) were female; Low-density lipoprotein (LDL) ≥ 3.37mmol/L is abnormal, 13 cases were male (65%), 7 cases were female (35%); Apolipoprotein AI (ApoAI) ≤ 1.0g/L was reduced, 56 cases were male (83.58%), 11 female cases (16.42%); Apolipoprotein AI (ApoAI) ≥ 1.6g/L was elevated, 0 males and 4 females (100%); Apolipoprotein B (ApoB) ≤ 0.6g/L was reduced, 28 males (93.33%), 2 cases of female (6.67%) apolipoprotein B (ApoB) ≥ 1.1g/L were elevated, 23 cases of male (69.70%), 10 cases of female (30%). The difference between the two groups was statistically significant (P<0.05). See Table 2.

Table 2: Comparison of abnormal blood lipid metabolism of different sexes in the experimental group.

-------	Male		Female		Chi-squ	P-value
	Abnormality (n)	Proportion (%)	Abnormality (n)	Proportion (%)		
Cho	18	60%	12	40%		
TG	5	62.5%	3	37.5%		
HDL-C	81	82.65%	17	17.35%		
LDL	13	65%	7	35%		
ApoAI (reduction)	56	83.58%	11	16.42%	30.00	<0.0001
ApoAI (ascension)	0	0	4	100%		
ApoB (reduction)	28	93.33%	2	6.67%		
ApoB (ascension)	23	69.70%	10	30%		

3.3 Comparison of the Distribution of Dyslipidemia between the Two Groups

Serum total cholesterol (CHO) ≥ 5.17mmol/L was abnormal, of which 30 cases in the experimental group were abnormal, accounting for 21.13%; 500 cases in the control group were abnormal, accounting for 62.27%. The difference between the two groups was statistically significant (P<0.05).

Triglyceride (TG) ≥ 2.3mmol/L was abnormal, of which 8 cases in the experimental group were abnormal, accounting for 5.63%; 154 cases in the control group were abnormal, accounting for 19.18%. The difference between the two groups was statistically significant (P<0.05).

High-density lipoprotein (HDL-C) ≤ 1.29mmol/L was abnormal, of which 98 cases in the experimental group were abnormal, accounting for 69.01%; 190 cases in the control group are abnormal, accounting

for 23.66%. The difference between the two groups was statistically significant (P<0.05).

Low-density lipoprotein (LDL) ≥ 3.37mmol/L was abnormal, of which 20 cases in the experimental group were abnormal, accounting for 14.08%; 207 cases in the control group were abnormal, accounting for 25.78%. The difference between the two groups was statistically significant (P<0.05).

Apolipoprotein AI (ApoAI) ≤ 1.0g/L was a decrease, and apolipoprotein AI (ApoAI) ≥ 1.6g/L was an increase. The above two conditions were abnormal. Among them, 67 cases were abnormally decreased in the experimental group, accounting for 47.18%, 4 cases were abnormally increased, accounting for 2.82%; 2 cases in the control group were abnormally decreased, accounting for 0.25%, and 246 cases were abnormally increased, accounting for 30.64%. The difference between abnormal increase and abnormal decrease between the two groups was statistically significant (P<0.05).

Apolipoprotein B (ApoB) ≤ 0.6g/L means a decrease, and apolipoprotein B (ApoB) ≥ 1.1 g/L means an increase. Both conditions were abnormal. Among them, 30 cases in the experimental group were abnormally decreased, accounting for 21.13%, 33 cases were abnormally increased, accounting for 23.24%; 56 cases in the control group were abnormally decreased, accounting for 6.97%, and 328 cases were abnormally increased, accounting for 40.85%. The difference between abnormal increase and abnormal decrease between the two groups was statistically significant (P<0.05). See Table 3.

Table 3: Comparison of the distribution of dyslipidemia between the two group.

-----	Liver cancer		Control		Chi-square with Yates' correction	P value
	Abnormality (n)	Proportion (%)	Abnormality (n)	Proportion (%)		
Cho	30	21.13	500	62.27	81.25	<0.0001
TG	8	5.63	154	19.18	14.64	<0.0001
HDL-C	98	69.01	190	23.66	115.0	<0.0001
LDL	20	14.08	207	25.78	8.41	<0.005
ApoAI (reduction)	67	47.18	2	0.25	385.8	<0.0001
ApoAI(ascension)	4	2.82	246	30.64	46.57	<0.0001
ApoB(reduction)	30	21.13	56	6.97	27.53	<0.0001
ApoB(ascension)	33	23.24	328	40.85	15.11	<0.0001

3.4 Comparison of Blood Lipid Determination Results between the Two Groups

Experimental group CHO (4.64±2.52) mmol/L, TG (1.33±0.64) mmol/L, HDL-C (1.14±0.39) mmol/L, LDL (2.58±1.64) mmol/L, ApoAI (1.04±0.32)) g/L, ApoB (0.92±0.36) g/L metabolic level was lower than the control group CHO (5.57±1.17) mmol/L, TG (1.78±1.35) mmol/L, HDL-C (1.53±0.34) mmol /L, LDL (2.91±0.82) mmol/L, ApoAI (1.48±0.20) g/L, ApoB (1.02±0.26) g/L, the differences were statistically significant (all P<0.05).See Table 4, Figure 2.

Table 4: Comparison of the results of blood lipid determination between the two groups.

Group	n	Cho	TG	HDL-C	LDL	ApoAI	ApoB
Liver cancer	142	4.64±2.52	1.33±0.64	1.14±0.39	2.58±1.64	1.04±0.32	0.92±0.36
Control	803	5.57±1.17	1.78±1.35	1.53±0.34	2.91±0.82	1.48±0.20	1.02±0.26
t, value		4.335	6.169	11.18	2.315	15.64	3.044
P value		<0.0001	<0.0001	<0.0001	<0.05	<0.0001	<0.0001

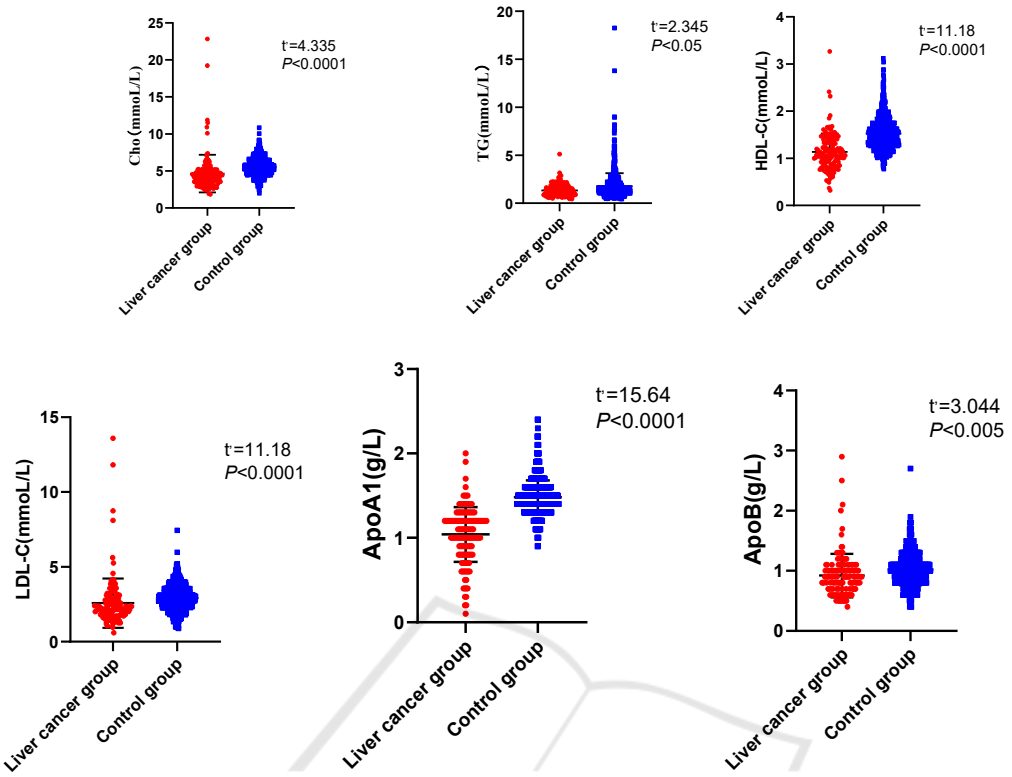

Figure 2: Comparison of blood lipid results between the two groups.

4 DISCUSSION

Serum total cholesterol, triglycerides, high-density lipoprotein, low-density lipoprotein, apolipoprotein AI, and apolipoprotein B were the main components of human blood lipids, and they were also key test indicators in clinical laboratories. The relevant test data was easy to obtain and easy Perform dynamic assessments. These indicators participate in signal transduction, inflammation, vascular factor regulation and other activities in the human body, and participate in the formation of cell membranes. Abnormal blood lipid metabolism was not only related to human cardiovascular and cerebrovascular diseases, but also closely related to the occurrence and development of tumors.

In the experimental group, 60% of men in the experimental group had abnormal serum cholesterol metabolism, 62.5% of triglyceride metabolism, 82.65% of high-density lipoprotein metabolism, and 65% of low-density lipoprotein metabolism, the abnormal decrease in apolipoprotein AI accounted for 83.58%, and the abnormal decrease in apolipoprotein B accounted for 93.33%. The abnormal metabolism of the above indicators accounted for higher proportions than women. The reason may be that the severity of liver damage in male patients with liver malignant tumors is generally higher than that in female patients, and the proportion of liver damage and alcohol consumption in male patients was higher than that in female patients. The specific reasons still need to be confirmed by further experiments, and there was no relevant literature report at home and abroad.

The metabolic level of the experimental group (CHO (4.64±2.52) mmol/L, TG (1.33±0.64) mmol/L, HDL-C (1.14±0.39) mmol/L, LDL (2.58±1.64) mmol/L, ApoAI (1.04±0.32) g/ L, ApoB (0.92±0.36) g/L) was lower than that of the control group. Lipids were an important part of the cell membrane. When cells become cancerous, the lipids on the cell membrane will be destroyed. Abnormalities will occur during the normal absorption, synthesis, and metabolism of lipids, resulting in a decrease in blood lipid metabolism. The reduction of blood lipid metabolism will further induce the normal construction of the body's cell membrane, leading to the continuous development of the body's tumor cells.

On the other hand, the liver parenchyma of patients with liver malignant tumors has been severely damaged. With liver damage, the liver will have more and more serious effects on the metabolism of blood lipids, and its ability to convert into lipids will gradually weaken. Serum total cholesterol, triglycerides, high-density lipoproteins, low-density lipoproteins, apolipoproteins AI, apolipoprotein B and other indicators will gradually decrease compared with the normal physical examination population.

Compared with the traditional small number of medical samples, the data comparison results were more accurate in the liver malignant tumor patient population and the same period. In this study, with the support of informatized medical health data, the correlation analysis between blood lipid metabolism and liver malignancies was carried out to provide a more accurate reference for the treatment and prognosis of liver cancer patients.

5 CONCLUSIONS

It was an important method to analyze the correlation between blood lipid and tumor by using health data measurement. In this paper, a large number of measurement data were collected through information system, and the correlation analysis between abnormal lipid metabolism and liver malignant tumor was carried out by chi-square test. It selected the performance index as an evaluation criterion including the metabolism of serum total cholesterol, triglycerides, high-density lipoprotein, low-density lipoprotein, apolipoprotein AI, and apolipoprotein B in patients with liver malignant tumors. Studies have found that the performance index was much lower than that of the normal population. Studies have shown that there were statistically significant differences in the distribution of abnormal blood lipid metabolism in patients with liver malignant tumors in different genders and different age groups. This study can assist clinicians to more quickly and accurately assess the development of liver malignant tumors, and provide a reference for the treatment of liver malignant tumors in the future.

With the rapid development of artificial intelligence and medical health data analysis technology, the application of information systems in the medical field has become more and more in-depth. In the next step, we will further use the information system to extract a large number of experimental data to carry out clinical research and analysis, and promote the deep integration of "medical and industrial" fields.

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