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Study on Characteristics and Influencing Factors of Coagulation Indexes in Pulmonary Infection Sepsis

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Abstract: ***Objective*:** To explore the characteristics and influencing factors of coagulation indexes in patients with pulmonary infection sepsis. ***Methods*:** 104 patients in Shaanxi Provincial Hospital of Chinese Medicine from January 2015 to April 2021 were collected and divided into case group (52 cases) and control group (52 cases). The general data and coagulation indexes of the two groups were statistically analyzed. The difference was statistically significant ($P < 0.05$). Binary logistic regression analysis was used. ***Results*:** The indexes of age PT, APTT, TT, FDP, D-Dimer, INR and PLT in the control group were significantly higher than those in the control group ($P < 0.05$); There was no significant difference in FIB-C ($P > 0.05$); Binary logistic regression analysis showed that D-Dimer and PLT were the risk factors of pulmonary infection sepsis ($OR > 1$, $P < 0.05$). ***Conclusion*:** FDP and D-Dimer are risk factors for the development of pneumonia into sepsis.

Keywords: Sepsis; Pulmonary infection; Coagulation index; Influencing factors

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1. Introduction

Sepsis is a high-mortality clinical syndrome caused by an infection-induced imbalance of the host's immune system and the damage of life-threatening organ function [1]. According to research, the incidence rate of sepsis is 20.6% [2], posing an economic strain while jeopardizing patients' lives and health. Inflammatory responses in sepsis can cause coagulation problems, activate endogenous anticoagulant factors and exogenous coagulation factors, and aggravate inflammatory responses [3]. The whole process has been circulating, leading in continual anticoagulant consumption and failure, and eventually disseminated intravascular coagulation, which leads to multiple organ failure and death [4]. The coagulation index is not only a useful tool for detecting coagulation disorders in sepsis, but it also serves as an observation index for anticoagulant therapy. The purpose of this study was to collect the coagulation indexes of patients with pulmonary infection sepsis and analyze the characteristics to obtain the risk factors.

2. Materials and methods

2.1. Clinical materials

104 patients in Shaanxi Provincial Hospital of Chinese Medicine from January 2015 to April 2021 were selected and divided into case group and control group, with 52 cases in each group.

2.2. Diagnosis criteria

Patients who were diagnosed as sepsis [5] and the source of infection was lung were included in the case group. Patients with a diagnosis consistent with community-acquired pneumonia [6] or hospital-acquired pneumonia [7] were the control group.

2.3. Exclusion criteria

Age <18 years old; patients who died within 24 hours after admission or were transferred without complete clinical auxiliary data.

2.4. Observation indicators and methods

The clinical data of patients were derived from the hospital medical record information system. 5ml of patient's elbow venous blood was collected within 24 hours of diagnosis, and the coagulation function indexes were detected by STAGO~R coagulation analyzer; PLT was monitored by Mindray 6900 hematology analyzer.

2.5. Statistical methods

Using SPSS 25.0 statistical software, the measurement data conforming to the normal distribution are represented by mean ± standard deviation ($\overline{X}\pm s$) and analyzed by two independent sample t-test. The measurement data not conforming to the normal distribution are represented by P_{50} (P_{25}, P_{75}) and analyzed by Mann Whitney U test. The counting data were expressed by rate (%), using Fisher exact probability method or chi-square test, with $P < 0.05$ as the difference, which was statistically significant, and binary logistic regression analysis was used.

3. Results

3.1. Comparison of general clinical data

There was no significant difference in occupation, age and smoking history between the two groups ($P > 0.05$). The gender ratio of the case group was significantly higher than that of the control group. The difference was statistically significant ($P < 0.05$), as shown in **Table 1**.

Table1.Comparison of general clinical data between the two groups [n (%)]

General information	(n=52)	Case group	Control group	Statistical value	P value
Gender	Male	42 (80.78)	33 (63.46)	3.873	0.049
	Female	10 (19.22)	19 (36.54)		
Age	P25 (69.00)	P50 (77.00)	P75 (83.00)	-1.226*	0.220
Occupation	Professional technicians	28 (53.86)	28 (53.86)	7.382	0.217
	Clerks	1 (1.92)	1 (1.92)		
	Farmer	7 (13.46)	9 (17.30)		
	Person in charge of enterprises and institutions	10 (19.23)	4 (7.69)		
	Manufacturing and related personnel	4 (7.69)	10 (19.23)		
	Soldier	1 (1.92)	0 (0.00)		
	State personnel	1 (1.92)	0 (0.00)		
Smoking history	No	32 (61.54)	33 (63.46)	0.041	0.839
	Yes	20 (38.46)	19 (36.54)		

Note: *is Z value, and other statistical values are x^2 value

3.2. Comparison with the control group

The coagulation indexes in the case group were significantly higher than those in the control group. There were significant differences in PT, APTT, TT, INR, FDP, D-Dimer and PLT ($P < 0.05$). There was no significant difference in FIB-C ($P > 0.05$), as shown in **Table 2**.

Table 2. Comparison of coagulation indexes between the two groups

Group	FIB-C(g/l)	PT(s)			APTT(s)			TT(s)		
Case group	0.31±2.24	14.6	16.5	20.5	41.53	50.25	60.9	15.63	16.8	19.38
Control group	0.20±1.24	12.8	13.55	14.1	34	40.5	44.73	14.9	15.85	16.7
Statistical value	10.825*		-9.065			-7.787			-5.662	
P value	0.587		<0.001			<0.001			<0.001	

INR		FDP (ug/ml)				D-Dimer (ug/ml)			PLT (×10^9L)		
1.22	1.42	1.89	9.33	20	33.23	4.95	9	20.75	134	194	234
1.03	1.1	1.16	3.4	5.75	9.4	1.7	2.55	5.28	128.85	186.5	251
-9.083				-7.585			-7.045			-5.492	
<0.001				<0.001			<0.001			<0.001	

Note: *Is the value of t, and the other statistical values are the value of z

3.3. Binary logistic regression

Binary logistic regression analyzes FDP and D-Dimer as the risk factors for the development of pneumonia into sepsis ($OR > 1$, $P < 0.05$), as shown in **Table 3**.

Table 3. Binary logistic regression analysis of two groups

Coagulation index	B	SE value	Wald value	P value	Exp(B)	OR (95%CI)
Age	-0.008	0.021	0.144	0.704	0.992	0.953-1.033
PT	1.800	1.738	1.072	0.300	6.049	0.201-182.507
APTT	0.022	0.036	0.371	0.542	1.022	0.952-1.098
TT	0.238	0.164	2.099	0.147	1.268	0.920-1.095
INR	-7.970	15.665	0.259	0.611	0.000	0.00-7.46
FDP	0.339	0.151	5.002	0.025	1.403	1.043-1.888
D-Dimer	-0.454	0.236	3.715	0.054	0.635	0.400-1.008
PLT	-0.003	0.003	0.825	0.364	0.997	0.990-1.004

4. Discussion

Pulmonary infection is the most common infection site in patients with sepsis, accounting for more than 50% [8], and its mortality is high [9]. In the process of pathogenesis, each inflammatory cell chemotaxis, inflammatory cells activate and express adhesion molecules to promote vascular endothelial adhesion molecules in corresponding parts. The activation of inflammatory cells will release lysosomal enzymes and reactive oxygen species, which can damage vascular endothelial cells through basement membrane and phagocytosis of pathogens. Internal subcutaneous collagen will expose platelet adhesion and aggregation, activate platelets, and combine with coagulation factor activation pathway TT, PT and APTT as well as change accordingly. The tissue plasminogen activator D-Dimer produced by thrombin binding to endothelial cell surface receptor will increase. During infection, tissue metabolism and blood flow accelerate, activated monocytes release interleukin-1, 6 and TNF, promote the production of fibrinogen in the liver, and affect the changes of FDP in the acute stage of stress.

Sepsis is a "blood stasis syndrome with three syndrome patterns and three therapies" [10], with a commonly utilized strategy for improving blood circulation and reducing blood stasis. Danhong injections [11] and Xuebijing injections [12] preserve vascular endothelial cells while also regulating immunological

and coagulation processes. In conclusion, this study's analysis of pulmonary infection sepsis electronic medical record data reveals that the coagulation indexes of patients with pulmonary infection sepsis are significantly higher than those of patients with pneumonia, and FDP and D-Dimer are risk factors for sepsis development.

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Disclosure statement

The author declares no conflict of interest.

References

[1] Singer M, Deutschman CS, Seymour CW, et al., 2016, The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). Jama, 315(8): 775-787.

[2] Xie J, Wang H, Kang Y, et al., 2019, The Epidemiology of Sepsis in Chinese ICUs: A National Cross-Sectional Survey. Critical Care Medicine, 48(3): 1.

[3] Yao Y, Zhang Y, 2017, Latest Understanding of the Pathogenesis of Sepsis. Journal of Medical Postgraduates, 30(07): 678-683. DOI:10.16571/j.cnki. 1008-8199.2017.07.002.

[4] Zhang Z, He M, 2020, Review of ISTH Guidelines "Diagnosis and Management of Sepsis Related Coagulation Disorders and Disseminated Intravascular Coagulation (2019)." Medical Journal of West China, 32(12): 1717-1720.

[5] Wang Z, Wei J, Zhu H, Cao Y, 2020, Consensus of Emergency Experts on Early Prevention and Blocking of Sepsis in China. Journal of Practical Shock (Chinese and English), 4(03): 168-177 + 185.

[6] Wang Z, 2012, Emergency Adult Community-acquired Pneumonia Diagnosis and Treatment Expert Consensus on the Initial Antibacterial Treatment Strategy of Community-acquired Pneumonia. Chinese Community Doctors, 28(19): 11 + 13.

[7] Shi Y, 2018, Guidelines for the Diagnosis and Treatment of Hospital Acquired Pneumonia and Ventilator-associated Pneumonia in Chinese Adults (2018 Edition). Chinese Journal of Tuberculosis and Respiratory Diseases, 41(04): 255-280.

[8] Zhou J, Qian C, Zhao M, et al., 2014, Epidemiology and Outcome of Severe Sepsis and Septic Shock in Intensive Care Units in Mainland China. Plos One, 9(9): e107181.

[9] Zhang X, 2020, Analysis of Pathogenic Bacteria and Prognostic Correlation Factors in 101 Patients with Sepsis. Yanji: Yanbian University.

[10] Wang J, Li Z, Li Y, 2006, Chinese Critical Care Medicine, 18(11): 5.

[11] Li Z, Du Z, Wang C, et al., 2015, Effect of Danhong Injection on Coagulation Function and Prognosis in Severe Sepsis. World Chinese Medicine, 10(08): 1197-1200.

[12] Zhang Z, He M, 2020, Review of ISTH Guidelines "Diagnosis and Management of Sepsis Related Coagulation Disorders and Disseminated Intravascular Coagulation (2019)." Medical Journal of West China, 32(12): 1717-1720.