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## Analysis of blood glucose levels in patients with schistosomiasis

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### ABSTRACT

559 cases of schistosomiasis patients admitted to hospital in three years to check blood sugar levels were found elevated blood sugar and diabetes was not statistically significant, and patients with severe liver damage blood glucose increased incidence of diabetes statistical differences significance.

### KEYWORDS

Schistosomiasis; Diabetes; Blood sugar levels.



Diabetes is a group of the hyperglycemia characteristic of metabolic disease<sup>[1-3]</sup>. Diabetes mellitus is a relatively common disease with major public health implications. Although much has been written regarding the clinical manifestations, treatment, and pathophysiology of diabetes mellitus, it remains a major problem whose rate is increasing<sup>[4]</sup>. Now that the post-liver damage can also cause elevated blood sugar diabetes<sup>[5]</sup>, non-alcoholic fatty liver disease and its downstream sequelae, hepatic insulin resistance and type 2 diabetes, are rapidly growing epidemics, which lead to increased morbidity and mortality rates, and soaring health-care costs<sup>[6]</sup>. As we known, schistosomes can damage the liver, does that schistosomiasis cause diabetes? Jingzhou County in China used to be one of the endemic regions with the highest prevalence of schistosome infection in the world, which provides a unique opportunity to investigate the association of schistosomiasis with diabetes and metabolic syndrome<sup>[7]</sup>. This research intends to study the relationship between schistosome and diabetes by observing blood glucose and liver function of 559 schistosomiasis patients.

## MATERIALS AND METHODS

1. General Information: A cross-sectional survey was carried out in hospitals of Jingzhou County, Hubei province, China in 2011-2013. Experimental group 559 cases, male 347 cases, female 212 cases, aged 16-75 years, all cases diagnosed with schistosomiasis.

2. Serum samples collected: All patients serum samples collected in fasting venous blood 3ml, separation of serum set - 20°C refrigerator, tested.

3. FBG, P2Hbg, ALT and AST were measured in the laboratory department.

4. Data were compared with ANOVA and post-box t-test. Significant difference was assigned at the  $p < 0.05$  level.

## RESULTS

1. The age distribution of the patients. The group of 559 cases of patients, male 347 cases, female 212 cases, and the ratio of male to female was 1.64:1; aged from 16 to 75 years old. Patients younger than 20 years old are 40, accounting for 5.19%; Patients between 20-40 years old are 181, accounting for 32.38%; Patients between 41-60 years old are 282, accounting for 50.45%; Patients older than 60 years old are 56, accounting for 10.01% ( TABLE 1).

TABLE 1 : Age distribution of the patients

Age distribution	Cases	%
<20	40	7.16
21~40	181	32.38
41~60	282	50.45
>60	56	10.01

2. 559 cases of patients, 29 cases with elevated FPG, accounting for 5.19%; 32 cases with elevated P2Hbg, accounting for 5.72%; In the late stage of schistosomiasis, the rate of blood sugar increasing and liver damage rates are significantly higher than the early stage of schistosomiasis ( TABLE 2).

TABLE 2 : FBG, P2Hbg, ALT and AST levels in early and late stage of schistosomiasis

TM	Early stage (N=320)	%	late stage (N=239)	%
FBG>7	13	4.06	16	6.69
P2Hbg>11.1	15	4.69	17	7.11
ALT>40	12	3.75	21	8.79
AST>40	10	3.13	20	8.37

3. The relationship between diabetes and liver injury, there was a moderate correlation between FPG or P2Hbg and ALT or AST. It means that with the increase of liver injury, FPG or P2Hbg increased following positive correlation, indicating that severe liver injury may lead to the generation of hepatic diabetes (Figure 1).

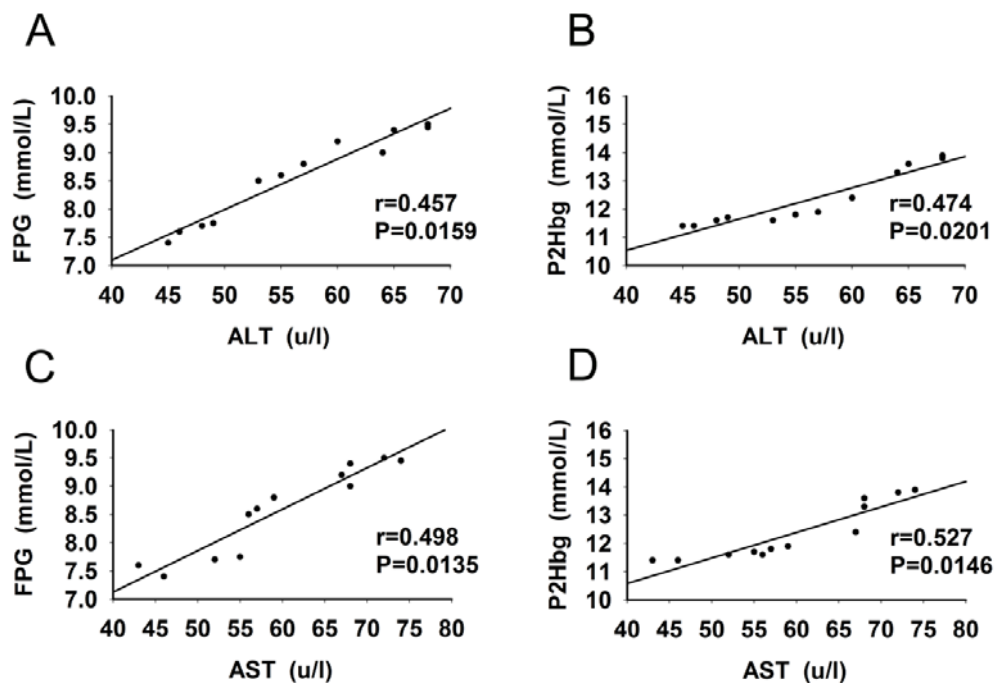


Figure 1 : Relationship between diabetes and liver injury. A the relationship between FPG and ALT; B the relationship between P2Hbg and ALT; C the relationship between FPG and AST; D the relationship between P2Hbg and AST

## DISCUSS

Schistosoma has high incidence in Jiangnan Plain as there so many rivers and lakes there, the harm of schistosome infection is very serious<sup>[8-10]</sup>. It can cause cirrhosis of the liver, growth disorders, abdominal pain, diarrhea, constipation and even death<sup>[11]</sup>. Schistosome cause liver damage, especially aroused attention. Liver damage can cause hepatic diabetes, whether schistosoma cause diabetes has been a topic of debate. Chen found that the associations between PSI and the lower prevalence of diabetes and a better metabolic profile in rural Chinese need to be confirmed in other populations. If confirmed, the protecting effect of helminth infection could be reconsidered in terms of therapeutic strategies for the treatment of diabetes and metabolic diseases<sup>[12]</sup>.

In this study, 29 cases with elevated FPG, accounting for 5.19%; 32 cases with elevated P2Hbg, accounting for 5.72%. In early stage of schistosomiasis, 12 cases with elevated ALT, accounting for 3.75%, 10 cases with elevated AST, accounting for 3.13%; In late stage of schistosomiasis, 21 cases with elevated ALT, accounting for 8.79%, 20 cases with elevated AST, accounting for 8.37%. But, there are no direct relationship between schistosomiasis and diabetes, only in liver damaged by schistosomiasis. It also can be SEA of schistosomiasis on blood sugar of mice with experimental type diabetes mellitus have some lowering effect which may stimulate the body 's immune response, causes T h1/Th2 immune deviation<sup>[13]</sup>.

In schistosomiasis development process, due to schistosome eggs can not pass hepatic sinusoid, then egg granuloma formation in the liver sinusoid, further blocking blood flow to the liver sinusoid, before the formation of sinus congestion<sup>[14, 15]</sup>. In slow blood, this has not been caused by sinus blockage before portal hypertension, mild liver cell damage or no damage, so basically normal liver function,

glucose metabolism in the liver in the role has not been affected, so blood sugar levels stable. In the evening the blood, due to the further development of the disease, sinus congestion before intensified, causing liver fibrosis, liver fibrosis, further causing portal hypertension. In this case, the liver function in patients with serum albumin decreased the proportion of white balls upside down, but less damage liver cells, elevated blood sugar levels so obvious. Viral hepatitis to liver cell damage-based, liver cell degeneration and necrosis of prominent lesions, thus affecting glucose metabolism in the liver, reducing glycogen synthesis, resulting in elevated blood sugar levels<sup>[16, 17]</sup>. In conclusion, only in the liver damaged by schistosomiasis can cause diabetes mellitus, there was no direct relationship between schistosome infection and diabetes mellitus.

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