

: 57 3 1999

, \*

\* . . . . .

= Abstract =

**The prevalence of diabetes mellitus in chronic liver disease**

Hyun Jung Roh, M.D., Byung Joo Choi, M.D., Sung Kwan Hong, M.D. Sang Hoon An, M.D.,  
Il Suh, M.D.\*, Kwang Hyup Han, M.D. Kap Bum Huh, M.D. and Hyun Chul Lee, M.D.

*Department of Internal Medicine, and Preventive Medicine\*, Yonsei University, Seoul, Korea*

**Background :** The insulin resistance and the altered glucose metabolism in chronic liver disease increase the alteration of glucose intolerance and the prevalence of diabetes mellitus. The prevalence of DM is higher in advanced cirrhosis than in early cirrhosis and higher in C- viral hepatitis or alcoholic liver disease than in B- viral hepatitis. The purpose of this study is to assess the prevalence of DM in chronic liver disease in Korea.

**Methods :** We reviewed the medical records of 417 patients with chronic liver disease who visit the Yonsei University Sevrance Hospital from January 1994 to March 1998. We examined fasting blood sugar, biochemical study and abdominal ultrasonography. DM was defined on the basis of fasting hyperglycemia (fasting blood sugar exceeding 140 mg/dl) at least two consecutive samples or active treatment with insulin or oral hypoglycemic agents.

**Results :**

- 1) The DM prevalence was 16.8% (70 cases) in total patients and 25.0% (56 cases) in cirrhotic patients.
- 2) According to sex, there was no statistically significant difference in DM prevalence (16.8% in men and 18.1% in women P=0.78).
- 3) The DM prevalence was increased with increasing of age (0% in below 30 years, 4.9% in 31-40, 19.6% in 41-50, 22.9% in 51-60, 21.3% in 61-70 and 44.4% in over 71 years, P<0.01).
- 3) According to severity of liver disease, the DM prevalence was higher in uncompensated cirrhosis than in compensated cirrhosis (2.3% in chronic viral carrier, 8.8% in chronic hepatitis, 17.9% in cirrhosis Child class A, 33.9% in class B, 29.5% in class C).
- 4) According to cause of liver disease, the DM prevalence was higher in C- viral hepatitis and alcoholics than in B- viral hepatitis (12.1% in B- viral hepatitis, 35.1% in C- viral hepatitis, 40.0% in alcoholics).

**Conclusion :** The prevalence of diabetes in the patients with chronic liver disease is much higher than in general population. And the DM prevalence is increased in advanced cirrhosis and C- viral or alcoholic hepatitis. The early diagnosis and treatment of DM in chronic liver disease patients are important. (Korean J Med 57:281-287, 1999)

**Key Words :** Prevalence, Diabetes mellitus, Chronic liver disease

• : 1998 12 29

• : 1999 6 24

• : , 134

(120-752)

E- mail : [endohclee@YUMC.yonsei.ac.kr](mailto:endohclee@YUMC.yonsei.ac.kr)

가 1.

, 1906 Naunyn "hepatogenous diabetes"

1). 1994 1 1 1998 3 31

417

가

가

2-8). (glucose uptake)

가

7). (glucose oxidation)

1997 140

mg/dl 6

가 140 mg/dl

가 2.

15 - 30% 1)

9-12). 1 - 10%

가

C

12-16). AST, ALT, (P- time)

C sequential multiple autoanalyzer

B B C

70- 75% second- generation ELISA(Abott)

가

2)

가 B C

가 6 transaminase(AST ALT)

가  
가  
Tourette  
,  
, C  
3)  
±  
( 2) , one-way ANOVA  
p 0.05  
SPSS release 7.5  
Window -  
1.  
417 309 (74.1%),  
108 (25.9%) 2.86:1 ,  
48.09 ± 13.61 (19- 80 ) (Table 1).  
82.18 ± 57  
44 (10.6%),  
150 (36.0%), A 106 (25.4%), B 56  
(13.4%), C 61 (14.6%)  
B 322 (77.2%), C 37 (8.9%),  
40 (9.6%), 18 (4.3%)

**Table 1. Sex and age distribution of the subjects**

	Sex		Total(%)
	Male	Female	
- 20	11	0	11( 2.6%)
21- 30	39	1	40( 9.6%)
31- 40	55	18	73(17.5%)
41- 50	84	22	106(25.4%)
51- 60	79	30	109(26.1%)
61- 70	30	30	60(14.4%)
71-	11	7	18( 4.3%)
Total(%)	309(74.1)	108(25.9)	417(100)

108.49 ± 43.75 mg/dl ,  
AST 46.03 ± 59.49 IU/L, ALT 49.78 ± 74.31 IU/L,  
4.10 ± 0.75 g/dl, 1.835 ± 2.78 mg/dl,  
Child - 82 ± 20.8% 305  
(73.1%), 112 (26.9%),  
355 (85.1%), 62 (14.9%)  
2.  
1) (Table 2)  
417 70 (16.8%)  
140 mg/dl  
224 56 (25.0%)

**Table 2. Prevalence of DM**

	No. of Subjects	No. of DM patients(%)
Total	417	70 (16.8%)
Liver cirrhosis	224	56 (25.0%)

2)  
16.8%,  
18.1% 가 (P=0.78, Table 3).  
30 0%, 31- 40  
4.1%, 41- 50 19.6%, 51- 60 22.9%, 61- 70 10.2%,  
71 44.4% 가 (P<0.01,  
Table 4).

**Table 3. Prevalence of DM according to sex**

Sex	No. of Subjects	No. of DM patients(%)
Male	309	52 (16.8%)
Female	108	18 (18.1%)

**Table 4. Prevalence of DM according to age**

Age	No. of Subjects	No. of DM patients(%)
- 20	11	0( 0.0%)
21- 30	40	0( 0.0%)
31- 40	73	3( 4.1%)
41- 50	106	21(19.6%)
51- 60	109	25(22.9%)
61- 70	60	13(21.3%)
71-	18	8(44.4%)

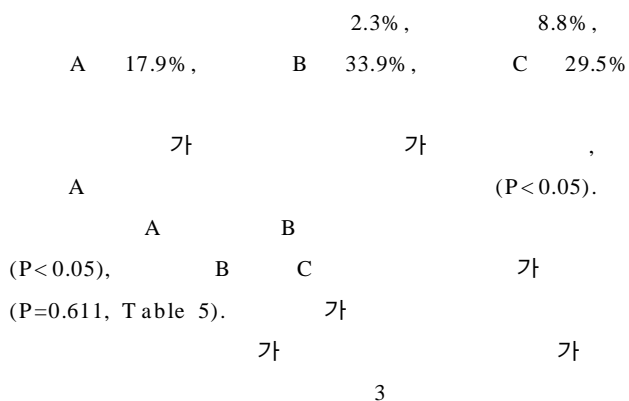
2- test : p<0.01

**Table 5. Prevalence of DM according to diagnosis**

Diagnosis	No. of Subjects	No. of DM patients(%)
Chronic viral carrier	44	1 (2.3%)
Chronic hepatitis	150	13 ( 8.8% )*
Liver cirrhosis - A	106	19 (17.8%)*
Liver cirrhosis - B	56	19 (33.9%)*
Liver cirrhosis - C	61	18 (29.5%)

\* one-way ANOVA : Chronic hepatitis - Liver cirrhosis A, p<0.05  
 Liver cirrhosis A - Liver cirrhosis B, p<0.05

3)  
 (Table 5)



(Figure 1).

**Table 6. Prevalence of DM according to cause of liver disease**

Cause	No. of Subjects	No. of DM patients(%)
B viral	322	39 (12.1%)*
C viral	37	13 (35.1%)*
Alcoholic	40	16 (40.0%)*
Others	18	2 (11.1%)

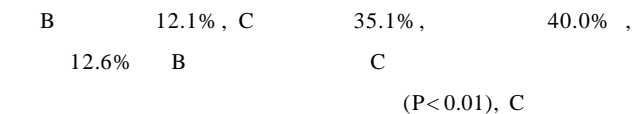
\* one-way ANOVA : B viral - C viral, p<0.01  
 B viral - Alcoholic, p<0.01

WHO (World Health Organization)  
 NDDG (National Diabetes Data Group)  
 가

**Figure 1. DM Prevalence according to diagnosis in 3 age groups.**

Ca+He : Chronic viral carrier + chronic hepatitis,  
 L/C A : Liver cirrhosis, Child A, L/C B : Liver cirrhosis, Child B,  
 L/C C : Liver cirrhosis, Child C.

4)  
 (Table 6)



가 , 가 C  
 12, 15). 40 59% , 63%  
 가 가 가 12).  
 가 가 가 B 가 77.2%  
 가  
 5 , 35.1% , 40.0% B 12.1% , C  
 44 (11%) B C  
 3 가  
 (bias) , , 13, 14, C  
 가 16. C  
 , C 가 가  
 가  
 . Kingston 10) , C 가  
 가 가 C  
 가 가 (hyperglobulinemia)  
 8.8% 가 가 가  
 가 16. B C  
 가 가  
 가 A 가  
 가 B 가  
 가 , C B 가  
 가  
 가 . Del Velchio 가 30  
 Blanco 12) (compensatory (7.2%)  
 liver cirrhosis) A , ,  
 (uncompensatory liver cirrhosis) B C  
 B C  
 가 B 가 가 , ,  
 140 mg/dl 33.9% , ,  
 , 3 1  
 20-25).

가

C

가

Bianchi 16)

가

REFERENCES

:

가

가

가

: 1994 1 1998 3

417

:

1) 417

16.8% (70 ) , 224

25.0% (56 )

2) 16.8% , 18.1%

가 (P=0.78), 30

0% , 31- 40 4.9% , 41- 50 19.6% , 51- 60 22.9% ,

61- 70 21.3% , 71 44.4% 가

(p<0.01).

3)

2.3% , 8.8% , A 17.8% , B

33.9% , C 29.5% A

(p<0.05).

4) B 12.1% , C

35.1% , 40.0% , 11.1% C

(p<0.01).

:

- 1) Naunyn B: *Der diabetes mellitus In. Nothnagels Handbuck. Vienna, Holder editor, 1906, pp128*
- 2) Collins J, Lacy W, Stiel J, Croifford O: *Glucose intolerance and insulin resistance in patients with liver disease. Arch Intern Med. 124:142, 1970*
- 3) Johnston D, Alberti K, Faber O, Binder C, Wright R: *Hyperinsulinism of hepatic cirrhosis; diminished degradation or hypersecretion? Lancet 1:10, 1977*
- 4) Keller U, Sonnenberg GE, Burckhardt D: *Evidence for an augmented glucagon dependence of hepatic glucose production in cirrhosis of the liver. J Clin Endocrinol Metab 54:961, 1982*
- 5) Proietto J, Dudley FJ, Aitken P: *Hyperinsulinemia and insulin resistance of cirrhosis: The importance of insulin hypersecretion. Clin Endocrinol 21:657, 1984*
- 6) Taylor R, Heine RJ, Collins J: *Insulin action in cirrhosis. Hepatology 5:64, 1985*
- 7) Alexander S, Ralph A: *Glucose metabolism in cirrhosis; a review with some prospectives for the future. Diabetes Metab Rev. 8:691, 1989*
- 8) Krusazynska Y, Harry D, Bergman R, McIntyre N: *Insulin sensitivity, insulin secretion and glucose effectiveness in diabetic and non-diabetic cirrhotic patients. Diabetologia 36:121, 1993*
- 9) Muting D, Wohlgemuth D, Dorsett R: *Liver cirrhosis and diabetes mellitus. Geriatrics 24:91, 1960*
- 10) Kingston M, Ashraf A, Atieh M, Donnelly R: *Diabetes mellitus in chronic active hepatitis and cirrhosis. Gastroenterology 87:688, 1984*
- 11) Marmo R, Gentile S, Carbone L, Del vecchio BC: *Diabetes and liver cirrhosis: role of age and hepatic function. (Abstract) J Hepatol. 4(Suppl), 64, 1987*
- 12) Del Vecchio Blanco C, Gentile S, MarmoR: *Carbone L, Coltorti M. Alteration of glucose metabolism in chronic liver disease. Diabtes Res. Clin. Pract 8:29, 1990*
- 13) Clara M, Ellis S, Vincent M: *Glucose tolerance and diabetes in chronic liver disease. Lancet 18:1051, 1967*
- 14) Creutzfeldt W, Ferichs H, Sickinger K: *Liver disease and diabetes mellitus. Progress in liver diseases, volIII New York, NY, Grune and Stratton 1970, pp371*

