Hepatogenous diabetes in patients with cirrhosis and ascites: correlation with inflammatory activity, systemic hemodynamics, renal function, and outcome

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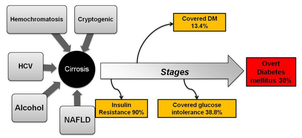
INTRODUCTION

Hepatogenous diabetes (HD) often complicates advanced cirrhosis. Its diagnosis often requires an oral glucose tolerant test (OGTT).

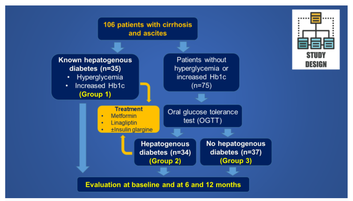


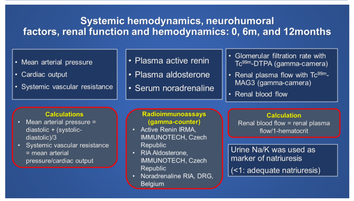
Fasting plasma glucose	126 mg/dL or higher on 2 separate occasions
HbA1c	6.5% or higher on 2 separate occasions
Oral glucose tolerance test (OGTT)	2-hour post OGTT blood glucose 200 mg/dL or higher

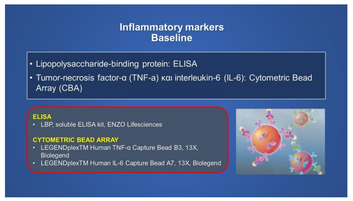
AIM

We investigated the association of HD with inflammation markers, systemic hemodynamics, renal function, and outcome in patients with cirrhosis and ascites.

METHOD







RESULTS

Baseline characteristics of patients included in the study

	Group 1 (n=35) Known HD	No known HD (n=71) Group 2 (n=34) HD with OGTT	Group 3 (n=37) No HD	p
Age (years)	59±1.9	57±2.1	56±2.3	NS
Gender (male/female)	25/10	26/8	26/11	NS
Cause of cirrhosis: alcohol/viral/other	22/8/5	22/6/6	26/8/3	NS
Beta-blockers (n)	22	20	22	NS
Child-Pugh class: A/B/C	9/21/5	8/22/4	10/23/4	NS
MELD score	13.2±2.1	13±1.9	12.8±2	NS
HbA1c (%)	5.4±0.7	5±0.5	4.9±0.6	NS
Urine albumin (mcg/mg cre)	23.2±2.1	20.7±1.8	20.1±1.6	NS

No differences were noted with regards to cirrhosis severity, HbA1c levels and microalbuminuria in the 3 Groups

Baseline inflammatory markers

	Group 1 (n=35) Known HD	No known HD (n=71) Group 2 (n=34) HD with OGTT	Group 3 (n=37) No HD	p 1 vs. 2	p 1 vs.3	p 2 vs.3
Inflammatory markers						
LBP (pg/ml)	12.2±1.8	7.5±1.4	6.5±1.9	0.03	0.01	NS
TNF-a (pg/ml)	14.7±1.9	8.6±2.1	7.2±2.6	0.04	0.04	NS
Il-6 (pg/ml)	12.8±2.5	12±3.8	9.4±3.2	NS	NS	NS

Patients with known HD had significantly higher inflammatory activity compared to those with OGTT diagnosed HD and those without HD

Baseline systemic hemodynamics and neurohumoral factors

	Group 1 (n=35) Known HD	No known HD (n=71) Group 2 (n=34) HD with OGTT	Group 3 (n=37) No HD	p 1 vs. 2	p 1 vs.3	p 2 vs.3
Mean arterial pressure (mmHg)	80.7±2.1	81.3±2.3	81.5±2.6	NS	NS	NS
Cardiac output (L/min)	6.64±0.5	6.32±0.6	6.21±0.5	0.04	0.03	NS
Systemic vascular resistance (dyn.sec.cm^{-5})	1215±48	1285±56	1312±62	0.04	0.01	NS
Active renin (pg/ml)	92.3±18.8	74.6±23.4	66.2±16	0.04	0.008	NS
Plasma aldosterone (ng/dl)	121±36	115±42	96±32	NS	NS	NS
Serum noradrenaline (nmol/l)	14.4±4.2	12.9±3.8	13±3.5	NS	NS	NS

Patients with known HD had significantly greater hyperdynamic circulation compared to those with OGTT diagnosed HD and those without HD

Baseline renal function and hemodynamics

	Group 1 (n=35) Known HD	Group 2 (n=34) HD with OGTT	Group 3 (n=37) No HD	p 1 vs. 2	p 1 vs.3	p 2 vs.3
Serum Cre (mg/dl)	1.1±0.3	1±0.2	1.±0.3	NS	NS	NS
Urine Na/K ratio	1.5±0.7	1.7±0.7	1.6±0.8	NS	NS	NS
Glomerular filtration ratio (ml/min)	70±5	77±6	83±7	0.03	0.009	0.04
Renal plasma flow (ml/min)	448±34	472±42	486±45	0.04	0.01	NS
Renal blood flow (ml/min)	570±30	614±36	634±41	0.04	0.01	NS

Patients with known HD had significantly lower glomerular filtration rate and renal perfusion compared to those with OGTT diagnosed HD and those without HD

Treatment of HD diagnosed with OGTT: effects on systemic hemodynamics and neurohumoral factors

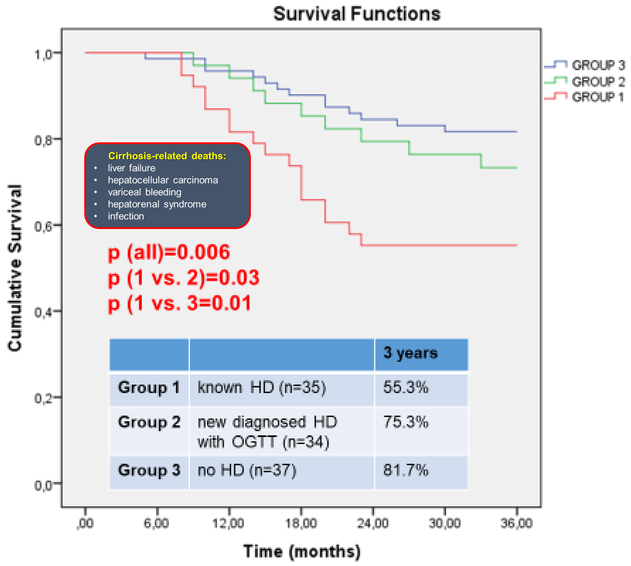
	Baseline	6 months	12 months	p
Mean arterial pressure (mmHg)	81.3±2.3	81.3±3	81.6±2.8	NS
Cardiac output (L/min)	6.32±0.6	6.22±0.3	6.17±0.2	0.04
Systemic vascular resistance (dyn.sec.cm^{-5})	1285±56	1307±41	1322±44	0.008
Active renin (pg/ml)	74.6±23.4	63.6±23.9	60.9±18.7	0.01
Plasma aldosterone (ng/dl)	115±42	111±32	108±49	NS
Serum noradrenaline (nmol/l)	12.9±3.8	12.6±5.1	12.2±4	NS

Treatment of OGTT diagnosed HD significantly improved systemic hemodynamics and active renin levels at 12 months

Treatment of HD diagnosed with OGTT: effects on renal function and perfusion

	Baseline	6 months	12 months	p
Serum Cre (mg/dl)	1±0.2	0.9±0.3	1±0.2	NS
Urine Na/K ratio	1.7±0.7	1.7±0.7	1.8±0.8	NS
Glomerular filtration ratio (ml/min)	77±6	83±6	85±5	0.009
Renal plasma flow (ml/min)	472±42	490±37	506±35	0.03
Renal blood flow (ml/min)	614±38	632±29	642±32	0.03

Treatment of OGTT diagnosed HD significantly improved renal function and perfusion at 12 months



		3 years
Group 1	known HD (n=35)	55.3%
Group 2	new diagnosed HD with OGTT (n=34)	75.3%
Group 3	no HD (n=37)	81.7%

CONCLUSIONS

- HD is associated with higher inflammatory activity
- Systemic hemodynamics, renal function, and survival are adversely affected by HD but improve significantly with diabetic treatment

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