Metabolic and Endocrine Profile of Non-Cirrhotic Portal Fibrosis (NCPF) - Carbohydrate dysmetabolism

Dr. Sanjib Dhungel*

Introduction

Non cirrhotic portal fibrosis (NCPF) is a common cause of portal hypertension in Northern India. It is a relatively recently described entity, viz, Ramalingaswami & Sama from All India Institute of Medical Sciences, New Delhi and Basu, Boyer and Basu Mullick from Calcutta were the pioneers working in this field.

Sama et al (1971) proposed diagnostic criteria for NCPF as follows and it remains accepted till today—

1. Well documented portal hypertension. A portal pressure of more than 15 mm. Hg. and / or collaterals as demonstrated by barium swallow examination or splenoportovenogram.
2. Patent portal and splenic veins as shown by splenoportovenography.
3. No evidence of hepatic cirrhosis in the liver tissue obtained by biopsy and declared adequate by the pathologist.

Various aspects of NCPF viz. clinical, radiological, hemodynamic, histologic and ultrastructural appearance have been extensively studied till date. But its metabolic and endocrine profile had remained completely unexplored. The aim of present study was to characterise the endocrine and metabolic aspects of NCPF chiefly in respect to its carbohydrate metabolism.

*Physician, Janakpur Zonal Hospital.

Material and Method

Eight cases of NCPF and five normal healthy controls matched for age, sex and body weight were studied. Fasting venous blood samples were collected for determination of basal values of the following parameters—

1. Blood glucose (Sharma & Sur 1966)
2. Serum insulin by radioimmunoassay.
3. Plasma cortisol (Mattingly 1962) 8 AM 8 PM
4. Lipid Profile—
 - (a) Total serum lipids (Fring et al 1970)
 - (b) Serum cholesterol (Chiamari & Henry 1959)
 - (c) Serum free fatty acids
 - (d) Serum triglycerides (Gotfried & Rosenberg 1973)
 - (e) Serum phospholipids (Zilversmit & Davis 1950)

A three-hour oral glucose tolerance test (GTT) was done after 1.75 gm. glucose / kg ideal body weight. Parameters analysed in the test procedure were :—

- (a) Blood glucose
- (b) Serum free fatty acids
- (c) Serum insulin
- (d) Plasma cortisol

Statistical analysis was done by using one tailed 'T' test. P value less than 0.05 was considered significant.

Results

Blood glucose concentration at various points in glucose tolerance curve was evaluated by using criteria proposed by Wilkerson et al (1960). 5 out of 8 cases were diabetic where as none of the subjects in control group showed diabetic curve.

Table I : Blood glucose levels (mean $\pm$ SE; mg%) during oral glucose tolerance test.

Time (in min.)	Control* 5	NCPF* 8
0	80.28 $\pm$ 4.82	96.66 $\pm$ 7.60
30	112.43 $\pm$ 11.56	145.44 $\pm$ 13.39
60	104.92 $\pm$ 13.60	179.18 $\pm$ 18.71
90	87.96 $\pm$ 12.64	190.03 $\pm$ 23.20
120	88.18 $\pm$ 9.59	193.05 $\pm$ 27.40
150	75.48 $\pm$ 6.88	165.96 $\pm$ 27.24
180	67.86 $\pm$ 7.15	146.41 $\pm$ 28.53

*No. of cases.

Blood glucose values during oral GTT was also evaluated by other methods, the results of which are shown below :—

Table II : Results of blood glucose level durings oral GTT expressed as area under glucose tolerance curve, H index and glucose tolerance sum.

	Control*	NCPF*	P. Value*
Area under GTT curve (Wynn & Doar, 1966)	543.16 $\pm$ 54.9	10.15 $\pm$ 122.95	<0.01
H index (Billewioz et al, 1973)	5.38 $\pm$ 0.83	15.22 $\pm$ 1.99	<0.001
Glucose Tolerance sum 0-3 hrs. (Danowski 1970)	333.14 $\pm$ 40.40	615.30 $\pm$ 76.77	<0.01

*No. of cases.

Values indicate mean $\pm$ SE in different groups.

Serum insulin during oral GTT

Table III : Serum immunoreactive insuline (IRI) levels (uv/ml) during oral glucose tolerance tests.

Time (in min)	Control	5*	NCPF	8*
0	4.10	$\frac{+}{-} 1.84$	7.94	$\frac{+}{-} 1.52$
30	61.00	$\frac{+}{-} 19.63$	29.31	$\frac{+}{-} 10.15$
60	56.25	$\frac{+}{-} 19.48$	32.50	$\frac{+}{-} 8.79$
90	43.20	$\frac{+}{-} 10.81$	40.31	$\frac{+}{-} 8.41$
120	37.60	$\frac{+}{-} 8.20$	50.06	$\frac{+}{-} 9.44$
150	35.60	$\frac{+}{-} 6.29$	60.00	$\frac{+}{-} 16.46$
180	21.10	$\frac{+}{-} 4.56$	29.38	$\frac{+}{-} 5.49$

*No of cases +
Values indicate mean — SE

Table IV : Insulinogenic index $\left\{ \frac{\Delta \text{IRI}}{\Delta \text{Blood Glucose}} \right\}$

Oral glucose tolerance test

Time (in min)	Control	5*	NCPF	8*	P. Value
30	1.69	$\frac{+}{-} 0.52$	0.42	$\frac{+}{-} 0.16$	
60	1.51	$\frac{+}{-} 0.51$	0.48	$\frac{+}{-} 0.28$	
90	5.49	$\frac{+}{-} 1.38$	0.47	$\frac{+}{-} 0.20$	<0.01
120	4.70	$\frac{+}{-} 2.26$	0.57	$\frac{+}{-} 0.26$	
150	2.64	$\frac{+}{-} 0.76$	1.19	$\frac{+}{-} 0.55$	
180	9.76	* *			

*No. of cases

* *Only one case

Values indicate means $\pm$ SE

Table V : Cumulative Insulin output per unit of blood glucose during oral glucose tolerance test.

Groups	No. of Subjects	area under insulin curve area under blood glucose curve
Control	4	2.63 ± 1.19
NCPF	8	0.40 ± 0.09

Values indicate mean $\pm$ SE

Serum free fatty acid during oral GTT

Table VI : Serum free fatty acid (FFA) levels (UFq/L) during oral GTT

Time (in min)	Control 4*	NCPF 8*
0	494.50 ± 179.66	852.50 ± 129.01
30	513.33 ± 315.63	588.50 ± 123.01
60	332.50 ± 112.35	474.75 ± 76.07
90	318.75 ± 88.61	404.38 ± 62.67
120	251.25 ± 55.73	323.50 ± 71.90
150	246.75 ± 40.91	383.13 ± 341.43
180	208.85 ± 45.80	341.43 ± 77.89

*No. of cases

Values indicate mean $\pm$ SE

Diurnal Variation in Plasma Cortisol.

Table VIII. Diurnal variation in plasma cortisol levels (mg%)

Group	No. of Cases	8 A. M.	8 P. M.
Control	5	21.70 $\pm$ 1.70	10.80 $\pm$ 1.02
NCPF	6	20.90 $\pm$ 1.46	8.92 $\pm$ 0.73

Values indicate mean $\pm$ SE

Fasting serum total lipids, cholesterol, triglycerides and phospholipids in control & NCPF

Table IX : Fasting Serum total lipids, cholesterol, triglycerides phospholipids.

	No. of Cases	In control (mg%)	No. of Cases	In NCPF (mg%)
Total Lipids	5	492.40 $\pm$ 27.25	11	531.64 $\pm$ 28.1
Cholesterol	5	172.40 $\pm$ 14.14	11	156.73 $\pm$ 12.5
Triglycerides	5	77.00 $\pm$ 15.43	9	95.00 $\pm$ 8.5
Phospholipids	5	167.80 $\pm$ 31.39	9	143.33 $\pm$ 12.1

Values indicate mean $\pm$ SE

Conclusion

There is carbohydrate dysmetabolism in NCPF. Oral GTT is abnormal in many these cases. Their blood sugar is normal in-fasting state but following glucose load a diabetic glucose tolerance curve is observed. Peak serum insulin response to oral glucose was delayed. Low insulinogenic index and low cumulative insulin output during oral GTT indicated relative insulin deficiency state. Free fatty acid levels and plasma cortisol levels were significantly different from normal control. No significant difference in lipid profile from control was noted.

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