Observation of Changes in Liverfunction Tests and Oral Manifestations in Cirrosis of Liver

J.K Mitra[1], Vinayak Kumar Mantu[2], Sony Narayan[3], Ruchi Mitra[4]

ABSTRACT

Introduction: Liver has got multiple functions and hence its insufficiency in a cirrhosis patient gives rise to involvement of various symptoms. The aim of the present study is to diagnose patients with clinical, oral and pathological test.

Material and Methods: 60 cases of liver cirrhosis were selected irrespective of age and sex and were included in the study group.They were divided into group I and depending on the cause of cirrhosis and 40 normal patients as controls were observed with detailed clinical examination, liver function test, renalfunction test and oral manifestations.

Result: In study group I and II liver function test like serum bilirubin, ALT,andprothrombin time as compared to control group were found to be significantly elevated whereas serum albumin was significantly reduced. More than 50% cases developed renal failure. Theoral hygiene was poor presenting with caries, extractions, calculus and periodontal problems with more in group I patients.

Conclusion: These observation can elucidate in diagnosing hepatorenal disease and its outcome. Also the screening and management of oral manifestations prior to organ transplantation can overcome complications after transplantation like septicemia and others.

Keywords: cirrhosis, liver function test,serum, hepatorenal, oral manifestations

INTRODUCTION

Medical practitioners since time immemorial have identified the liver as one of the important organs of the body, along with the heart and brain. It was the roman anatomist, Galen who made the liver, the principal organ of the human body, arguing that it emerged first of the organs in formation of fetus.[1]

Liver has got multiple functions and hence its sufficiency in a cirrhosis patient gives rise to a complex syndrome which includes disturbance of nitrogen metabolisms, bile formation, coagulation opathies, disturbances of nervous systems, circulatory system,renal system and endocrine system. Liver disease largely affects the water and electrolyte equilibrium. It is known since the times of Austin Flint (1863) who made specific reference to kidney function in cases of cirrhosis of liver. He found that the patients with cirrhosis exhibit avid sodium retention with oliguria, with urinary output of about 300cc to 500cc.[2]

Also,with the consideration of the oral cavity, liver dysfunction in the formof mucosal membrane jaundice, bleeding disorders, petechiae,increased vulnerability to bruising, gingivitis,gingivalbleeding (even in response to minimum trauma),[3,4] *foetor hepaticus*(a characteristic odor ofadvanced liver disease), cheilitis, smooth and atrophictongue, xerostomia, bruxism and crusted perioral rash.[5] In these patients, chronic periodontal disease is acommon finding. As commented by Friedlander,[6] this is believed to be the result of ethanolinducedperipheral autonomic neuropathy giving rise toalterations in salivary metabolism and secretion.

There is water and electrolyte disturbances in cases of cirrhosis although the cause is not known, Eissenmenger et alandRicketteet al have given their opinion that the patients of liver disease with ascites have hypernatraemia.The sodium retention is due to increased activity of the mineralocorticoid hormones from adrenal glands. But merely this hormonal basis is not enough to explain the water and electrolyte disturbances found in cirrhosis cases.Abnormal renal regulation of water and electrolytes occur commonly leading to impaired diuresis and dilutionalhyponatraemia.[7]

In the state ofjharkhand the practice of alcoholism is rampant. Various genetic and hereditary factors increase the susceptibilty to develop cirrhosis of liver. In view of the fact that there is paucity of work on cirrhosis of liver and the fact that cirrhosis is the major cause of mortality and morbidity in this part of the country, this work was undertaken.

The patients of cirrhosis admitted in different units of Medicine Department were included in the study. The renal function as monitored by recording daily urine output, routine examination ofurineplasma and urine creatinineestimatation of sodium, potasium, chloride, blood urea and GFR.

In Jharkhand there is a huge reservoir of patients of cirrhosis due to conventional causes and over and above due to practice of alcoholism. A study pertaining to cirrhosis of liver, hence would be of increasing relevance and utility in this part of the country. Therefore the aim of the present work was to diagnose patients with cirrhosis of liver with respect to clinical, oral manifestations, Radiological and pathological tests.

MATERIAL AND METHODS

This study was done on patient of cirrhosis due to different etiologies with their altered renal functions and electrolytes, chemistry admitted in Rajendra Institute of Medical Scienc-

[1]Associate Professor, Department of Medicine, [4]Senior Resident, Department of Dentistry, Rajendra Institute of Medical Sciences, Ranchi, [2]Senior Lecturer, Department of Oral Pathology and Microbiology, Vananchal Dental College, Garhwa, [3]Physician, Tata Memorial Hospital, Jamshedpur, India

Corresponding author: Dr Ruchi Mitra, Senior Resident, Department of Dentistry, Rajendra Institute of Medical Sciences, Ranchi, India

How to cite this article: J.K Mitra, Vinayak Kumar Mantu, Sony Narayan, Ruchi Mitra. Observation of changes in liverfunction tests and oral manifestations in cirrosis of liver. International Journal of Contemporary Medical Research 2016;3(4):1080-1084.

es Ranchi, Jharkhand. Prior to the start of the study an ethical clearance was obtained from the ethical review committee.
Forty healthy people of both sexes of same age groups and socioeconomic status were selected. The subjects included in this group were medical students, interns, house physicians, nurses, paramedical students and attendants of the patients admitted in different units of Medicine Department, were kept as control.
60 patients of cirrhosis of liver were selected as subjects for study among the patients admitted in the different units of the Department of Medicine in Rajendra Institute of Medical Sciences Ranchi.
Study group- 60 patients
Control groups- 40 patients
The study group was further divided in to two groups:

I. Cirrhosis due to alcoholic liver disease -40 cases
II. Cirrhosis due to miscellaneous causes- 20 cases
    a. Due to viral hepatitis-18 cases
    b. Due to heavy metal poisoning- 2 cases

Inclusion criteria

Following patients were included in this study, those who were above 50 years of age and giving consent

Exclusion criteria

Patients with cardiac failure, on diuretic therapy, chronic kidney disease, on drugs like SSRI,TCA,MAO, INHIBITORS etc which alter renal profile and electrolytes.
Patients undergoing hemodialysis and peritoneal dialysis, recent trauma, surgery, and burns.Infants children and adoloscent were excluded and only adult cases were included to avoid bias of research work.
The selections were made on the basis of detailed history and clinical examinations. The diagnosis of all patients were made through clinical examination and investigations done.
Oral Manifestations
Oral examination was done for Oral manifestations such as the presence of gingivitis (assessed by Papilla bleeding index - PBI), dental caries,edentulism, and dental hygiene (using OHIS assessed by Green and Vermillion index 1964),were performed prospectively in patients with chronic liverdisease and controls.The patients who were in coma and unconscious and did not showed signs of recovery were excluded from the study.

Estimation of Blood Urea
DiacetylMonoxine Method

This technique employing for reaction have been devised for determining urea.Reagents used were Sodium tungstate- 10% sulphuric acid- 2/3N,Diacetyl monoxine2%solution,sulphuric acid-phosphoric reagent, shock standard solution of urea 250mg%. 0.1 mlof blood wastaken into 3.3 ml of water 0.3 ml of 10% sodium tungstate and 0.3 ml of 2/3 N sulphuric acid was added. Both mixed well and centrifuged. Now 1 ml of supernatant fluid was added to 1 ml of water. 0.4 ml diacetylmonoxine and 1.6 ml of sulphuric acid-phosphoric acid added to the mixture. This was placed in boiling water bath for 30 minutes. It was cooled and read against a water blank at 480 millimicrons.

$$\text{Calculation- Mg urea / 100 ml} = \frac{\text{Reading of unknown} > 100\text{x } 0.25}{\text{Reading of the standard x } 0.25}$$

Estimation of serum creatinine

Reagents used were Sodium tungstate- 5%, sulphuric acid- 2/3N solution, stock standard 1 mg creatinine per 100 ml, standard creatinine solution 0.04N mg/ml,picric acid 0.04 N Solution and Sodium hydroxide 0.75 N Solution. 2 ml of diluted serum with 2 ml of distilled water was taken.
The calculation was made as follows:

$$\text{The value of creatinine /100cc the value of creatinine of diluted urine X } 100 \text{ mg\% 24 hours creatinine in urine} = \frac{\text{the urinary output in cc x value of of urinary creatinine/100cc}}{100}$$

Estimation of serum- sodium,potasium and urinary sodium

It was done by Flame photometry using E.E.L flame photometer.
Principle of flame photometer: The solution is passed carefullythrough photometer. The solution evaporated in the flame and the salt dissociated to give neutral atoms, some of this, though only very small proportions move in a higher energy state. An orange filter is used for determining sodium the intensity of D-line (589 million core) being read. Potasium is determined by using a deep red filter such as III ford 609 emitting light at 404.4 and 766.5 millimicron.

Diagnostic criteria for renal failure in cirrhosis-

a. Urine output less than 400ml/24 hours
b. Serum creatnine exceeding 0.2 mmol/L i.e 2.2 mg/100 ml

Renal failure not responding to volume expansions, urinary sodium level below 10 mEq/L or 2 mEq/L in patients receiving diuretics a specific gravity above 1.020RFI and FENa(Fractional excretion of filtered sodium) less than 1 are used to explain " Functional renal failure or hepatorenal syndrome".

Diagnostic criteria for acute tubular necrosis

1. Specific gravity of urine below 1.010.
2. Urinary sodium above 20 mEq/L.
3. R.F.I and FENa above 1.

RESULTS

Table 1 shows the age distribution in study and control group, in the age group of 15-22 years, 5 cases (8%) were taken, 9cases (14%) belonged to the 23-32 years age group, 16 cases (28%) belonged to the 33-43 years age group and the maximum number of patients were of 45 years and above age. 30 patients or 50% patients belonged to this age group.
Table 2 shows liver function test in study and control group. A statistically significant correlation was found in group I and II in the liver function tests.
Table 3 shows a significant correlation in the renal function test in group I and II. In study group II the mean level of serum bilirubin was 17.68±4.74mg% SGPT 239.62 ±72.30 IU/L prothrombin time 47.5 ±6.65 sec. serum albumin 2.93± 0.55 mg% where as in control group the value recorded were serum bilirubin 0.65±0.13 mg% SGPT 28.05±4.87 IU/L prothrombin time 13.85 ± 0.5 sec., serum albumin 4.03±0.21 gm%.
The oral manifestations were seen for gingivitis,dental caries,toothedentualism. Group I and group II showed poor oral

hygiene as compared to controls with more number of patients suffering from dental caries, missing teeth and gingivitis in group I. In group II 2 patients were observed with gingival staining (plumbism) due to lead poisoning.

DISCUSSION

Cirrhosis is the end result of hepatocellular injury that leads to both fibrosis and nodular regeneration throughout the liver which causes severe impairment of liver function. Disorder of cardiac, respiratory and renal functional impairment may also develop. Hepatic encephalopathy may also develop as an end result.

Cirrhosis can result from almost all forms of liver injury e.g by viral hepatitis alcoholism and hepatitis due to drugs. The mortality of patient with renal failure is high. Previous studies, have also reported high incidence of morbidity and mortality.[8] Kalso –Castellob while studying the fluid and electrolyte disturbances in terminal stage of cirrhosis cases, demonstrated that electrolyte disturbance in cirrhosis cases can be life threatening and must be recognized early and treated.[9] The present study has been undertaken to study the changes in renal function and serum electrolyte level in cirrhosis of liver as well as to analyse the oral changes in relation to the liver disorders.

Hence it was evident that in study group I (alcoholic hepatitis) liver functions parameters were more significantly raised ($p<0.001$) while prothrombin time was raised significantly. However the serum albumin level was low as compared to control group. Similar observation of liver function tests were recorded in group II patients. Allen J. A rief et al (1973) in their study showed almost similar data for the liver function test in cases of advanced liver disease.

The hepato renal syndrome in acute renal failure of unknown cause developing in patients with chronic liver disease results due to a combination of redistribution of fluid between intra and extracellular compartments and intrarenal events, reducing renal blood flow (activation of the rennin- angiotensin system) and increased in vasoconstricting prostaglandins.

Prognosis of hepato renal syndrome is poor and depends on recovery of hepatic function with other relevant management.

Forty (40) normal individual with regards to their renal

Age in years	Study Group	Control Group
	n(%)	n(%)
15-22	5(8)	4(10)
23-32	9(14)	8(20)
33-43	16(28)	12(30)
45 and above	30(50)	16(40)

Sex	Study Group		Control Group
	Group I	Group II	
Male	30	16	30
Female	10	4	10

Table-1: Showing the age and gender distribution in study and control group.

Group	Range	Mean	± SD	S.E(d)	"t" value	'P' Value
Control group (no=40)						
Serum bilirubin(mg%)	0.4-0.8	0.65	0.13			
S.G.P.T(ALT)	20-35	28.05	4.87	-	-	-
Prothrombin Time	12-14	13.85	0.5			
Serum albumin(gm%/100ml)	3.8-4.5	4.03	0.21			
Study Group: I (no=40)						
Serum Bilirubin(mg%)	7.4-14.5	10.8	2.86	0.9	11.27	0.003
S.G.P.T(ALT)	90-305	139.4	59.20	18.75	5.93	0.002
Prothrombin Time	25-32	29	2.82	0.9	17.22	0.006
Serum albumin(gm%/100ml)	2-3.9	2.83	0.38	0.14	8.5	0.005
Study Group: II (no=40)						
Serum Bilirubin(mg%)	10.2-25.6	7.68	4.74	0.75	22.70	0.002
S.G.P.T(ALT)	120-350	239.62	72.30	11.48	18.42	0.003
Prothrombin Time	34-56	47.5	6.65	1.05	32.04	0.004
Serum albumin(gm%/100ml)	2.0-4.0	2.93	0.55	0.098	11.22	0.006

Table-2: Showing liver function test in control and study group I,II.

Group	Range	Mean	±SD	S.E	T value	P value
Study group I (40)						
Blood Urea	20-106	45.95	20.68	3.38	5.78	0.002
Serum creatitine	1.2-4.4	2.68	0.83	0.137	14.23	0.003
G.F.R	40-116	88.8	21.12	3.62	6.31	0.006
Study group I (40)						
Blood Urea	22-58	35.8	11.03	3.60	2.61	0.004
Serum creatitine	0.8-3.3	2.06	0.66	0.21	6.3	0.002
G.F.R	68-114	90.1	19.76	6.40	3.36	0.004
Study group I (40)						
Blood Urea	20-40	26.4	4.0	-	-	-
Serum creatitine	0.5-1.0	0.73	0.18	-	-	-
G.F.R	100-116	111.65	6.32	-	-	-

Table-3: showing renal function test in cases of advanced stage cirrhosis in both study and control group

Study groups	Caries (mean±SD)	Extraction (mean±SD)	DI (mean±SD)	CI (mean±SD)	OHI mean±SD)	PBI (mean± SD)	Gingival staining (n)
Group I	4.26±3.8	6.2±8.4	2.06±0.2	2.19±0.3	2.5±1.3	2.2±1.2	-
Group II	3.89±2.3	8.8±5.4	2.01±0.1	2.12±0.2	2.1±1.1	2.1±0.8	2
Control	1.58±1.8	3.01±4.2	1.04±0.6	0.63±0.6	1.47±0.8	1.86±0.7	-

Table-4: Oral manifestations

function was studied. The mean value for blood urea, serum creatinine and GFR were 26.4, 0.73, 111.65respectively in control group.

In study group comprising 60 cases of cirrhosis of liver (mainly viral origin) renal failure was observed in 31 cases. This is in accordance with the observation of Wilkinson et al[11] and Rig Larsen and Plazoo[12] who showed that renal failure occur in cirrhosis cases were about 62% and 55% respectively.

To access the renal function, blood urea, serum creatinine, GFR, were measured in the study group and the mean level, were compared with the mean level of the control group.The mean level of blood urea in group I cases was 45.96%(±SD20.68%). This was found to be significantly higher than the mean blood urea level of control group, which was 26.4mg% (±SD4.0%). Similarly the mean serum creatinine level in group I was 2.68mg% (±SD0.83%) which was significantly higher than the mean serum creatinine level to the control group 0.73 mg% (±SD0.18mg %). t being 14.23, p<0,01.

The mean GFR in group I was 88.8ml/ mm (±SD21.12) which was lower than the mean GFR of control group (111.65ml/mm) SD ±5.11. This was stastistically significant. In group II cases all the parameters studied to assess the renal function varied significantly from the normal.

Untreated oral diseases (including dental problems) can lead to infections and sepsis and may cause manycomplications in transplanted patients.[13] In the literature bacterial sepsis is the most common cause of deaths, after transplantation, occurring during the first postoperative months and the risk of infection also increased by the over-immunosuppression of these patients. A potential source of infection may be dental foci. The present study also included the oral manifestations as generally there is neglect of dental health in liver disorders.Concerning dental caries we registered carious teeth in 71% of the hepatitis patients, while there is one study with67% affected patients.[13] The average of dental caries was higher in groupI than group II

(4.26±3.8 in group I, 3.89±2.3 in group II as compared to the controls 1.58±1.8) (Tabl 4).

About the presence of dental plaque the average ofDI was 2.06; 2.01 in hepatitis group, compared to 1.04 in control(Table 4). Whichis similar to the Barbero et coworkers.[14] Theyobserved in 85% of patients with hepatitis poor oral hygiene,in 45% periodontitis and in 15% gingivitis catarrhalis. Barbero, 1996).Also the calculus index in hepatitis groupI and II was 2.19,2.12which reflects that the majority of patients hadsubgingival calculus. In controls we detected the averagevalue of calculus index 0.63 (Tabl. 4).Some authors reported the same as our findings.

Measures of oral hygiene, dental care, and periodontalparameters were worse and the number of teeth requiringtreatment was higher in hepatitis patients with cirrhosis than in healthy subjects[15] Regarding the results from Papilla bleeding index theMean in hepatitis patients was 2.2 and 2.1, compared to the value in controls with 1.86.This infers that moderate gingivitis was present in liver cirrhosis patients. The present study indicates a neglect in oral hygiene with increased rate of decayed teeth and edentualism.The same conclusion was mention by J Guggenheimeretal,[14] which established that the presence of 2 or morecarious teeth and/or 2 or more teeth that were mobile dueto periodontal disease were indicators of severe dentaldisease as well as neglect of oral health.

CONCLUSION

Liver cirrhosis is a major disorder observed in the present study. This work might help in managing the cases of cirrhosis and serve as a guide to establish sophisticated technique for the effective management of such patients.This may also be of immense help to those patients of cirrhosis of liver who have lost all hope of leading a fruitful life.Oral hygiene is often neglected so this study included screening for oral manifestations.The monitoring of oral health by dentists beforetransplantation and the achievement of specific protocols ofprophylaxis are helpful in the prevention of complicationsafter transplantation in these patients.These facts again pose the question of the place ofdentists in the global medicine, especially their principal rolenot only in oral health, but also in successful livertransplantation.

REFERENCES

1. Schrier RW, Arroyo V, Bernardi M, Epstein M, Henriksen JH, Rodes J. Peripheral arterial vasodilatation hypothesis: a proposal for the initiation of renal sodium and water retention in cirrhosis hepatology 1988; 8:1151-7.
2. Arroyo CR. Plasma rennin activity and rennin substrate concentration in patients with liver disease.Cir Res 1967;20:594-98.
3. Golla K, Epstein JB, Cabay RJ. Liver disease: current perspectives on medical and dental management. Oral Surg Oral Med Oral Pathol Oral RadiolEndod. 2004; 98:516-21.
4. Hazin R, Abu-Rajab Tamimi TI, Abuzetun JY, Zein NN. Recognizing and treating cutaneous signs of liver disease. Cleve Clin J Med. 2009;76:599-606.
5. Grau-García-Moreno DM. Dental management of patients with liverdisease. Med Oral. 2003;8:231.
6. Friedlander AH, Marder SR, Pisegna JR, Yagiela JA. Alcohol abuseand dependence: psychopathology, medical management and dental implications. J Am Dent Assoc. 2003;134:731-40.
7. Hecher R, Sherlock S. Electrolyte and circulatory changes in terminal liver failure in cirrhosis.Lancet 1956;11:1121-25.
8. Goldstein H, Boyle JD. Spontaneous recovery from the

hepatorenalsyndrome.Engl J Med 1965; 272: 895-7.
9. Coratelli P, Passavanti GM, AmerioA.New in hepatorenalsyndrome. KidneyInt 1985;28(supp 17):S145-147.
10. Allen MJ, Allen JI. Peritovenous shunting as compared with medical treatment in patients with alcoholic cirrhosis and massive ascites. England J of Mass Medical Soc 1989;22:305-308.
11. Wilkinson SP, Blendis LM. Frequency and type of renal failure and electrolyte disorders in fulminant hepatic failure. Br Med J 1974;1:186-89.
12. Ring Larsen H, PalazooU. Renal failure in fulminant hepatic failure and terminal cirrhosis 1985;22:585-90.
13. Barbero P, Garzino Demo MG, Milanesio M, Ottobrelli A. The dental assessment of the patient waiting for a liver transplant. Minerva Stomatol. 1996;45:431-439.
14. Guggenheimer J, Eghtesad B, Close JM, Shay C, Fung JJ. Dental health status of liver transplant candidates. Liver Transpl. 2007;13:280-286.
15. Novacek G, Plachetzky U, Potzi R, Lentner S, Slavicek R, Gangl A, Ferenci P. Dental and periodontal disease in patients with cirrhosis - role of etiology of liver disease. J Hepatol. 1995;22:576-582.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 23-02-2016; **Published online**: 20-03-2016