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Original article:

Clinical pathological correlation in 118 autopsy cases of cirrhosis of liver

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Abstract:

Introduction: The day has not arrived when predictive value of liver disease can be given like many laboratory tests. Autopsy studies provide us with useful baseline data to start a step towards achieving good morphological accuracy.

Material Method: The present study was retrospective and prospective which compromised of 118 cases of cirrhosis detected from the period January 2008 to December 2013.

Observation: 3960 autopsies done during this period were scrutinized and 824 cases had liver pathology. Out of the 824 cases 118 had cirrhosis as the liver pathology, which makes incidence of cirrhosis at autopsy as 14.3% of all liver pathology, which shows a decreasing incidence of cirrhosis which may be due decrease in autopsy rate over the years.

Conculsion: The reasons for the continuing decline are complex and include attitudes toward autopsies of hospital administrative staff, medical staff, and family members and also because of increase in diagnosis by liver biopsy and introduction of antifibrotic therapy.

Keywords: Alcoholic Cirrhosis; Liver; Liver function test.

Introduction

The word cirrhosis comes from the Greek word kirrhos, which means orange yellow. Laennec gave cirrhosis its name kirrhos in 1819 in a brief footnote to his treatise De l'auscultation mediate. The definition of cirrhosis remains morphological, described by a working party for the World Health Organization (WHO) in 1978 as: "a diffuse process characterized by fibrosis and the conversion of normal liver architecture into structurally abnormal nodules.[1] Liver is vulnerable to a wide variety of metabolic, toxic, microbial and circulatory insults. Liver diseases and cirrhosis contribute to 23.59% of mortality in world and ranks 27th as major cause of death in world. In India, it is 2.74 % of all the causes of death.[2] The exact prevalence of cirrhosis is not known because the disease is often silent. Nearly 30% to 40% of cases are discovered at autopsy, indicating that in substantial proportion of people, the disease goes undetected during life. The leading cause of liver disease in our study is excess alcohol consumption. The other causes of liver disease and liver cirrhosis are Hepatitis B and C infections, which silently damage the liver over a period of years. There is also an emerging disease of the liver called NASH (or fatty liver), mainly due to 'westernisation' of our diet and a sedentary lifestyle, and associated disorders like obesity, diabetes and high triglyceride levels. Liver function test are also studied in present study

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were total bilirubin levels were found to be 5.1 mg/dl. The mean AST/ALT ratio was 0.9 which was less than 2.3:1 indicating alcoholic etiology. Other signs, symptoms and cause of death were also evaluated in present study so as it can if a benchmark for future ante mortem and postmortem clinical diagnosis of cirrhosis.

Aims and objectives

1. To classify liver cirrhosis etiological basis. 2. To study liver function test (LFT) in cases of cirrhosis.3 To study clinical features and complications of cirrhosis. 4. To study cause of death in cases of cirrhosis.

Material and method

This was a descriptive cross sectional retrospective (2008-2011) and prospective (2012-2013) study carried out at Lokmanya Tilak Memorial Municipal General Hospital which is a tertiary care hospital in the Department of Pathology which is having Post mortem Histopathology Subunit where daily autopsies are done and prompt histopathology reporting is done. All Cases diagnosed as cirrhosis, which were noted on autopsy records and which were confirmed by histology were included in this study.all clinical and laboratory data was collected from clinical data sheets at time of autopsy and from autopsy record sheets.

Data entry and Statistical Analysis: Data entry and analysis was done in Microsoft Office Excel 2007. Master Chart was prepared in Excel.

Observation and result:

A total of 118 patients of cirrhosis were studied. The results obtained are analysed as follows.

Table1& 2: Year wise presentation of cirrhosis at autopsy

Total number of autopsies done during Jan 2008 till December 2013	3960
Total number of autopsies with liver pathology	824
Total number of autopsies with cirrhosis as liver pathology	118

Year	**Total no. of autopsy**	**Autopsies with liver pathology**	**Autopsy with cirrhosis**	**Percentage of cirrhosis(%)**
2008	1248	309	28	11.8
2009	1025	178	21	12.7
2010	456	79	10	21.1
2011	390	90	19	23.6
2012	414	89	21	23.6
2013	427	79	19	24.0
Total	3960	824	118	14.3

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The **year wise and sex distribution** of cases of cirrhosis is shown in the ***Table 1*** above which shows a decreasing number of autopsy and decreasing trend of incidence of cirrhosis on autopsy from 2008 to 2013 .

Maximum number of cases were in the **age group** of 31-40 years (25.4%). 23.7% of the patients belonged to the age group of 41-50 years.16.9 % of the patients belonged to the group of 51-60 years. The youngest case of cirrhosis was of 1 year of age and oldest case was of 90 years of age. Out of 118 patients with cirrhosis of liver, 84 patients (71%) were males and 34 patients (29%) were females, when expressed in the ratio the **male to female ratio** is 2:1.

97 patients (82%) were having positive history of alcoholism, remaining 21 patients(18%) were non alcoholic. The youngest case with **history of alcoholism** was 18 years and eldest was 90 years**.** Of the total 97 patients of alcoholism, 93 patients(95%) were males and remaining 4 were females(5%).

97 patients (83.2%) had alcohol associated cirrhosis, 2 patients(1.6%) had viral associated cirrhosis like Hepatitis B, Hepatitis C each. Three patients(2.4%)had Wilson's disease,one patient each of hemochromatosis secondary to thalessemia sickle cell anemia, post necrotic cirrhosis, cirrhosis secondary to storage disorder and NASH.10 patients (8%) had cryptogenic cirrhosis**.**

Majority of the patients (50.5%) consumed 100-200 ml/day, 20.6% consumed between 200-400 ml/day (***GRAPH 1& 2).*** 36% of the alcoholics were consuming **alcohol for duration** 10-20 years. 24 % alcoholics were consuming for a period more than 20 years. Mean duration of alcohol consumption was 11 years in females and 18.4 years in males**.** Most common **symptoms** associated with cirrhosis were fluid retention (67%), followed by fever (53.3%), vomiting (35.5%) abdominal pain (32.2%), hematemesis (16.9%) and malena 9.3%.

Hepatomegaly was an important finding in alcoholics seen in 64% patients jaundice was seen in 42.3%. Seizures were seen 27.1% cases. Other **signs of liver failure** were flapping tremors (8.4%), testicular atrophy (2.5%), menstrual irregularities (2.5%) and decreased body hair (1.6%).

Raised Bilirubin was seen in 80% cases, SGOT and SGPT were raised in 85% and 42% cases respectively. Hypoalbunemia was seen in 80% cases. A/G ratio less than <1.5 in 83% cases.. The mean level of Serum Bilirubin was 5.1 mg/dl. The highest level was seen was 21.9mg/dl.The mean levels of AST/SGOT and ALT/SGPT are 336 IU/L and 146 IU/L respectively. The mean level of alkaline phosphatase is 156 IU/L. The mean level of serum albumin is 2.8g/dl. The average A/G ratio is 0.9. 52% of patients showed low Serum Sodium levels, the mean Serum sodium level is 135.6mEq/L

Most common **complication** was ascities(33.8%),other complications were hepatic encephalopathy (23.7%) portal

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hypertension in 13.5% cases. Hemorrhagic varies was seen in 22% and peritonitis in 5% cases while a cases of coagulopathy was noted**.**

The most common **cause of death(*Table 10*)** in cases of cirrhosis was hepatocellular failure (24.5%),followed by bronchopneumonia (12.7%), hepatic encephalopathy and varies contributed 11% of cases. Intrapulmonary haemorrhage was seen in 8.4% cases. Septicaemia and multi organ failure was seen in 9.3% cases. Rarely cause of death was CCF ,acute pancreatitis, peritonitis secondary to intestinal perforation, renal failure secondary to acute pyleonephritis, acute tubular necrosis, DIC, ARDS and HCC.In case of NASH it was secondary to acute coronary insufficiency. In one case of Biliary cirrhosis cause of death was bronchopneumonia. Virus induced cirrhosis showed varied causes like hemorrhagicvarices, peritonitis and intrapulmonary haemorrhage. In 3 cases of Wilson's disease death was secondary to CCF, hepatocellular failure and intrapulmonary haemorrhage respectively. In case of hemochromatosis cause of death was hepatic encephalopathy and septicaemia.

Discussion:

The present study compromised of 118 cases of cirrhosis detected from the period January 2008 to December 2013. 3960 autopsies done during this period were scrutinized and 824 cases had liver pathology. Out of the 824 cases 118 had cirrhosis as the liver pathology, which makes incidence of cirrhosis at autopsy as 14.3% of all liver pathology the findings are comparable to study conducted by **MS Bal et al**.in which the incidence of cirrhosis was 14%.[3]

Age and sex distribution of cirrhosis:

48.1% cases were in the age group 31-50 years, and mean age of cirrhosis was 43.67 years. It is occurred a decade earlier than the study by **MS Bal et al.**[3] in which 42.8% cases of cirrhosis were in age group 41-50 years. It is also similar to study conducted by **R Manjunath et al.** were mean age was 48.6 years and most common age group affected was 40-70 years. Many other studies by **Tarun Kumar et al., Nandkumar et al. and Chakrabati et al.** also the most common age group affected were 41-60 years. There was male preponderance seen in our study. The male to female ratio was 2:1. In study conducted by MS Bal et al. there was only single female case of cirrhosis. Male predominance was also seen in study by **R Manjunath etal.** were only 16% of cases were females. In other studies like also males were more affected.[4 5 6]

Distribution of cases according to etiology of cirrhosis:

Though identification of cirrhosis at autopsy is easy but etiologic characterisation may be difficult. The results of various causes illustrated earlier results identified alcoholic as the most common cause.

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Table 3: Etiological comparison of cirrhosis with other studies

STUDY	Number of cases	ALCOHOL INDUCED	VIRAL	BILIARY/ AUTOIMMUNE	WILSON'S	HEMOCHROMATOSIS	NASH	POST NECROTIC	CRYPTOGENIC	OTHERS
R. Manjunathet al. KIMS Hospital,2014[4]	50	80%	16%						4%	
Goncalves PL et al. 2014[7]	262	40.5%	26.7 %						10.6 %	3.8%
Medha Y Raoet al., MS Ramaiah Medical College, Bangalore,2008[8]	43	58.1%	18.6 %					4.6%	18.6 %	
Nandakumaret al[5]. 2003	46	65%	25%				5%		5%	
Terada et al. 1992[9]	209	12.4%	80.3 %	5.1%	0.4%	1.4 %				0.4%
Present study	118	83.2%	1.6%	0.8%	2.4%	1.6 %	0.8 %	0.8%	8%	0.8%

In a study conducted by Deepak Kumar et al in Delhi it was found that that there is decline in prevalence

of HBV infection as a cause of chronic liver disease in the past five years. In the present study decreased incidence of HBV associated chronic liver disease can be attributed to this. So according to the above a mentioned result there is a need to create more awareness among general population regarding adverse effect of alcohol consumption.[4]

A single case of biliary cirrhosis(0.8%),in which we came across a case of biliary cirrhosis secondary to exta hepatic biliary atresia in a 12 month old male, which was a operated case of extra hepatic biliary atresia in which peripheral blood showed leuco-erythoblastic reaction.

3 cases (2.4%) of cirrhosis were secondary to Wilson's disease. The average age of onset of Wilson's disease is 11.5 years and die before age of 30 years as quoted by **Ronald F. Pfeiffer** in his article on Wilson's disease, there is progressive copper accumulation ultimately compromising hepatic function, the hepatic storage capacity is also eventually exceeded and unbound copper spills out of the liver and is deposited in other organs and tissues like heart, kidney, pancreas, brain etc where it also provokes damage and dysfunction. In our study the average age was 15 years which is earlier than the average age for cirrhosis in rest of cases. These cases presented with altered sensorium irrelevant talk. The indirect bilirubin was raised in all three cases.[10]

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There were two cases (1.6%) of hemochromatosis secondary to thalessemia and sickle cell anaemia. The case of thalessemia was a 9 year male child ,came with complaints of kneejoint pain and swelling, he was on continuous blood transfusions, and had been operated for splenomegaly, other case was of 90 years male known case of sickle cell anaemia who came with urinary complaints and constipation in both the conditions cirrhosis was secondary to hemochromatosis because of iron overload due to repeated blood transfusions for haemolytic anaemia.

Other causes included a case of NASH, post necrotic cirrhosis, and fatty acid oxidation.

Obesity, diabetes, hyperlipidemia and female sex are important risk factors for NASHas mentioned by **K Das**[11], in our study it was in a 65 years old female known diabetic and hypertensive, admitted for acute coronary insufficiency. No liver function tests were done in this case. The liver showed extensive fatty change and fibrotic band extending between the portal tract giving rise to ill formed nodules. While the post necrotic cirrhosis was seen in 0.8% patient in present study. The case of storage disorder induced cirrhosis was of defect in fatty acid oxidation in a 3year old male with complaints of developmental delay, the MRI of this case showed fatty change in neck muscles. Enzyme levels of carnititne and other biochemical tests were not done. Special stain of Glycogen like PAS and PAS with diastase is negative.

Cryptogenic cirrhosis contributed only 8% of total cases a series of discoveries in the laboratory and a few clinical observations, have established the aetiology of cirrhosis in the vast majority of patients, and the diagnosis of cryptogenic cirrhosis is infrequent, comparison is tabulated shows markedly reduced incidence of cryptogenic cirrhosis.

Alcoholism and sex predilection in cases of alcoholic cirrhosis

As present study comprised of large number of cases of alcoholic cirrhosis the alcoholism history was studied in more detail. Studies show that the amount of alcohol consumed and the duration of that consumption are closely associated with cirrhosis. 97 cases were having history of alcoholism. Of those, 95% were male. Similar results were seen in study by **Terada et al.**[9] where 92% alcoholics were male and 8% were female. In study by **Gronbaeket al.** the alcoholic male contributed to cirrhosis was 72%.[12]

QUANTITY OF ALCOHOL CONSUMED (1ml=0.789g)

Majority of the patients 50.5% were consuming 100-200 ml/day, **Lena Van Waes, Charles S Leiber** in their study of alcoholic patients the average intake was 90-180g/day.[13] **Thorkild et al** who conducted prospective study on 258 alcohol abusing men showed that 22% of the patients consumed 100-125g per day. 21% consumed more than 250 grams per day and only 5 % consumed 50-75 g/day. **Morgan and**

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Shelock evaluated 100 alcoholics the amount was greater than 100g/day. [14]

Duration of alcohol consumption

36% of the alcoholics were consuming alcohol for duration 10-20 years. Our study correlates with **Thorkild et al** who showed that mean duration of alcohol consumption was 10-13 years. **Morgan and Sherlock** in their study revealed that mean duration of alcohol intake was 20.4 years in men and 16.8 years in women.[14]

Signs and symptoms of cirrhosis

Most common symptoms associated with cirrhosis were fluid retention (67%), followed by fever (53.3%)

Hepatomegaly was an important finding in alcoholics seen in 64% patients, jaundice was seen in 42.3%.

The present study correlates with the study by **Medenhall et al** [15] (n=363) in which hepatomegaly was seen in 87%,jaundice was seen in 60% . Abdominal pain was seen in 18 % of cases. In other study by **Lischner et al**[15] (n=169) hepatomegaly was 81% jaundice was in 37%. **R. Manjunath et al, KIMS** Hospital, 2014 (n=50) icterus was seen in 70%, edema in 60%.[4]

Complications associated with cirrhosis (decompensated)

Cirrhosis and its complications represent the end in the spectrum of chronic liver diseases, irrespective of aetiology. The natural history of cirrhosis is classically characterisedby an asymptomatic phase termed compensated cirrhosis, followed by the development of complications from portal hypertension and/or liver dysfunction termed decompensated cirrhosis. In current study of 118 cases half of the (59) cases had complications of cirrhosis. Most common complication was ascitis (33.8%). Results are comparable to retrospective study by **Shivnathan V et al**[16]to know the etiology and complications of liver cirrhosis in Germany were of the 236 cases 55% had compensated cirrhosis and 45 % had decompensated cirrhosis in which the complications in decreasing order were ascites , varies, encephalopathy and peritonitis. Similar findings were seen in **Kim JH et al**[17] were most common complication was ascites followed by encephalopathy, varices and peritonitis.

Liver function test (LFT)

The liver function tests were studied and the mean results are compared with other studies in the table below

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TABLE 4: LFT

Study	Serum Bilirubin(mg/dl)	SGOT/AST IU/L	SGPT/ALT IU/L	ALP IU/L	Sr. Albumin g/dl
Medha Y Rao et al, MS Ramaiah Medical College, Bangalore,2008(n=43) [8]	3.39	170.93	193.2		2.82
Spahr et al, Geneva 2011(n=163)[18]	5.32	ASAT= 90		160	
R. Manjunath et al ,KIMS Hospital,2014(n=50) [4]	6.69				2.49
Present study (n=118)	5.1	336	146	158	2.8

The present study showed mean Serum Bilirubin levels at par with **Spar et al** results which is a marker of hepatocellular damage. The alkaline phosphatase values are also similar. Serum amino transferase are also raised but not as much as in study by **Medha Y Rao et al.[8]** The ratio of mean AST/ALT is 2.3, which suggests majority of cases are of alcoholic etiology as mentioned in review of literature table for different laboratory investigation for etiology of cirrhosis.

In present study Serum Sodium Levels was less than normal levels (<135 mEq/L) in 52% of patients. Similar results were seen in study by **Angeli P et al[19]** (n=997) were 49.4% had level <135 mEq/L. A study by **Kim JH, et al**,[17]Korea, 2008 also showed similar results with 47.9% patients Sodium levels <135mEq/L, Also 50.4% patients in study by **Shaikh S et al** showed Sodium levels <135mEq/L. [20]

Cause of death in cases of cirrhosis

In present study the most common cause of death in cirrhosis is Hepatocellular failure (24.5%), followed by bronchopneumonia (12.7%). Rarely cause of death was CCF, acute pancreatitis, peritonitis secondary to intestinal perforation, renal failure secondary to acute pyleonephritis, acute tubular necrosis, DIC, ARDS and HCC. In the study conducted by **Samonakis DN et al** [21] of the 231 cases which died the leading cause of death was hepatocellular failure in 23.8%(n=55), hepatorenal failure in 21.6% (n=50). Virus induced cirrhosis showed varied causes like haemorrhagic varices, peritonitis and intrapulmonary haemorrhage. Similar findings have been noted by **Gentilini P et al[22]** were oesophageal varices, ascites, hepatic encephalopathy and hepatocellular carcinoma

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reduced survival in 405 cases of virus induced cirrhosis.

In cases of Wilson's disease death was secondary to hepatocellular failure, congestive cardiac failure (CCF) and intrapulmonary haemorrhage, while in study by **Svetel M et al**[23] of long-term outcome in Serbian patients with Wilson disease most common cause of death was hepatic failure in 16 of 20 cases of Wilson disease.

Conclusion:

Cirrhosis is a common presentation of many uncommon etiologies. In our study alcohol was the most common cause which is a preventable cause. The sign, symptoms, complications, liver function tests give a clue to the underlying cirrhosis of liver and to its etiology. Our study beign a pilot study can be a comparable guide for early diagnosis of cirrhosis and avoid death of the patients by appropriate precautions and treatment options.

Tables and graphs

TABLE 5

PARAMETER	**FINDINGS**
Age (30-50 years)	49.1%
Sex(Male: Female)	84:34
History of alcoholism(Male: Female)	93:4
Mean gross weight of liver	1200-1300 grams
Colour of liver (yellow)	57.6%

Table 6

CAUSES	**NO. OF CASES**	**PERCENTAGE**
Alcoholic Cirrhosis	97	83.2%
Viral- HBV HCV	1 1	0.8% 0.8%
Biliary Cirrhosis	1	0.8%
Wilson's Disease	3	2.4%
Hemochromaosis Secondary To Thalessemia Sickle anemia	 1 1	 0.8% 0.8%
NASH	1	0.8%
Post Necrotic	1	0.8%

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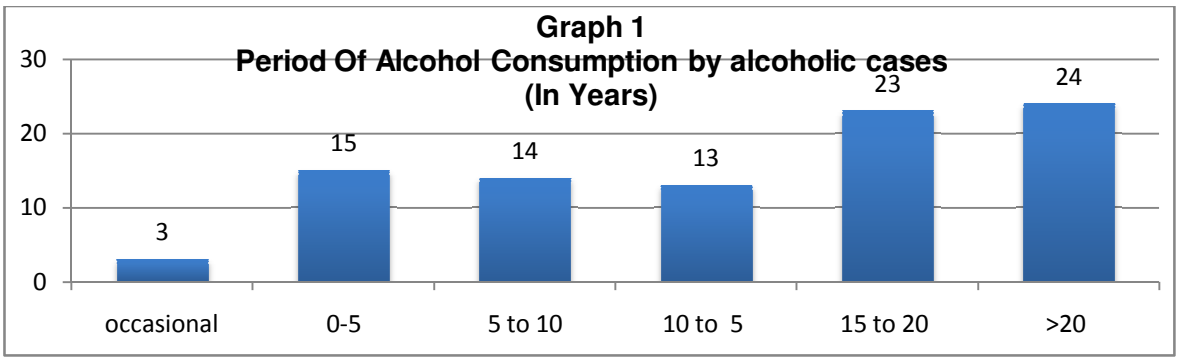
Cryptogenic	10	8%
Storage Disorder	1	0.8%
Total	118	100%



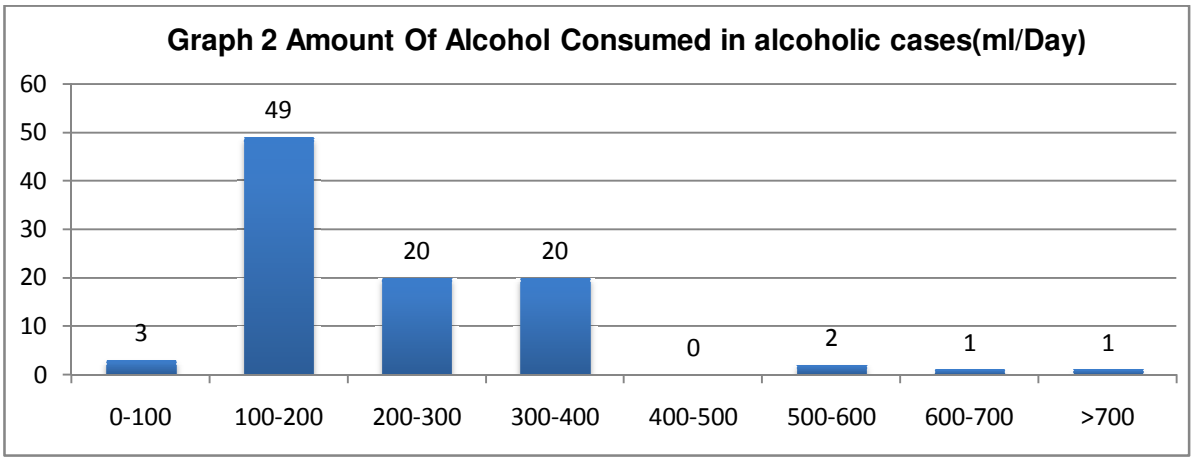


TABLE 7

Test	Levels Normal	Levels Abnormal	Mean levels
Serum Bilirubin	19.6%	80.4%	5.1 mg/dl
Serum Aminotransferases			
SGOT(AST)	14.3%	85.7%	336 IU/L
SGPT(ALT)	57.9%	42.1%	146IU/L
Serum Alkaline Phosphatase	70%	30%	158IU/L
Serum Albumin	20%	80%	2.8mg/dl
A/G Ratio	17%	83%	0.9
Serum Sodium	48%	52%	135.6mEq/l

TABLE 8

SIGNS & SYMPTOMS	NO. OF CASES	PERCENTAGE(%)
Fever	63	53.3
Vomiting/Diarrhoea	42	35.5
Hematemesis	20	16.9
Malena	11	9.3
Abdominal pain	38	32.2
Fluid retention	**80**	**67.7**
Hepatomegaly	**76**	**64**
Splenomegaly	8	6.7
Weight Loss	15	12.7
Altered Sensorium	12	10.1
Jaundice	50	42.3
Seizeurs	32	27.1
Flapping Tremors	10	8.4
Testicular Atropy	3	2.5
Menstrual Irregularities	3	2.5
Decreased Body Hair	2	1.6
Gynecomastia	0	0

TABLE 9

COMPLICATIONS	NO. OF CASES	PERCENTAGE
Ascites	**20**	**33.8%**
Encephalopathy	14	23.7%
Portal Hypertension	8	13.5%
Hemorrhagic Varies	13	22%
Coagulopathy	1	1.6%
Peritonitis	3	5%

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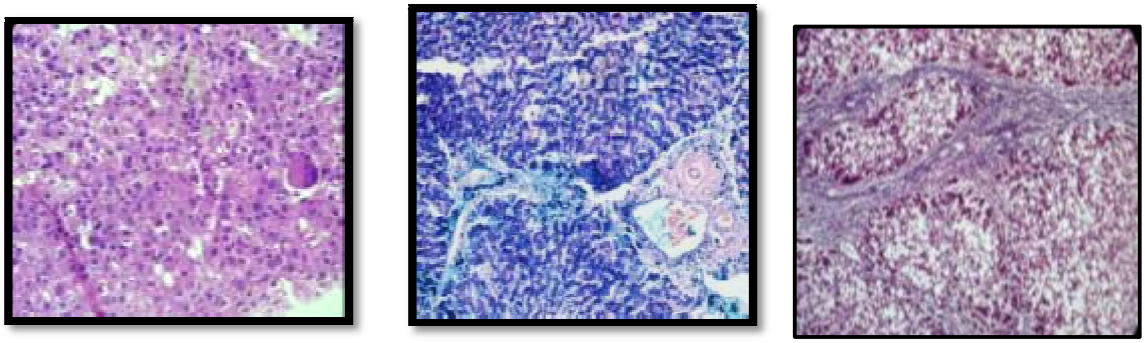
Table10

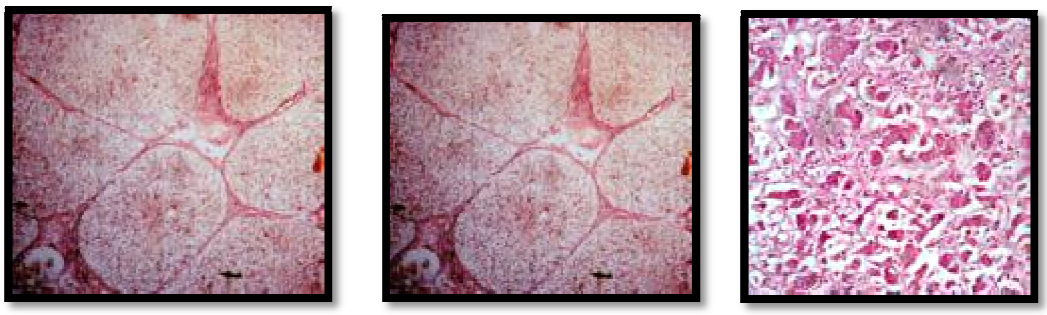
SR. NO.	CAUSE OF DEATH	Alcoholic Cirrhosis	Virus induced	Wilson's disease	Biliary Cirrhosis	Hemochromatosis	NASH	Postnecrotic	Cryptogenic	Storage disorder	PERCENTAGE
1.	**Hepatocellular failure**	**27**		**1**					**1**		**24.5%**
2.	Hepatic encephalopathy	13				1					11.8%
3.	Ruptured oesophageal varies	11	1						1		11%
4.	Bronchopneumonia	13			1					1	12.7%
5.	Intrapulmonary haemorrhage	7		1				1	1		8.4%
6.	Septicaemia and MODS	8				1			2		9.3%
7.	CCF	3		1			1				4.2%
8.	Acute pancreatitis	4									3.3%
9.	Peritonitis	1	1						1		2.5%
10.	Renal failure	2									1.6%
11.	HCC	2									1.6%
12.	Other causes-DIC, CVA, ARDS, Aneurysm of MCA, pulmonary oedema	6							4		8.4%

[1 , 2, 3]

[4 ,5 , 6]



[7,8,9]



[10, 11, 12]

LEGENDS (Top left to right)

Figure 1: Micronodular Cirrhosis of Liver showing pale yellow surface of liver characterized by small, granular nodulations. Scarring is comparatively fine and uniform in distribution.

Figure 2: Macronodular cirrhosis of liver showing coarse irregular scars with large hertogenous nodulations. Bumpy appearance of external surface viewed in silhouette

Figure 3: Mixed Cirrhosis of liver

Figure 4: Macronodular cirrhosis in case of Hepatocellular carcinoma.

Figure5: Enlarged liver with wrinkled capsule. Cut surface shows Miconodular Biliary Cirrhosis.

Figure 6: H & E section showing lymphoid aggregrates in fibrous septate.

Figure7: H & E section showing nucleomegaly, prominent nucleoli tumor giant cell features of hepatocellular carcinoma.

Figure 8: Prussian blue stain showing hemosiderin deposition n hepatocytes in case of hemochromatosis

Figure 9: Masson trichrome stain showing collagen bands stained blue, Hepatocytes stained red.

Figure10: Reticulin stain showing fibrous bands stained in black.

Figure11: Orcein stain showing cytoplasmic brown granular deposits confirming copper accumulation.(arrow)

Figure12: H& E stain showing cholestasis and bile plug.

References

[1] Anthony PP, Ishak KG, Nayak NC, Poulsen HE, Scheuer PJ, Sobin LH. The morphology of cirrhosis. J Clin Pathol. 1978;31:395-414

[2]INDIA : LIVER DISEASE.[Internet] WHO data published in 2011 April. Available from: http://www.worldlifeexpectancy.com/india-life-expectancy.

[3] MS Bal, SP Singh, VK Bodal, SS Oberoi, Kanwal Surinder. Pathological Findings In Liver Autopsy. JIAFM, 2004; 26(2).

[4] R. Manjunath, Nagesh H. N, Vaishali Bhardwaj. Clinical Co Relation between Arterial versus Venous Ammonia Levels in Hepatic Encephalopathy in Cirrhosis of Liver. JEMDS. 2014 May 12;(3)19: 5322-5333

[5] Nandakumar R, Naik AS, Pandit B, Kamat R, Bhatia SJ. Effect of Helicobacter pylori eradication on serum ammonia levels in patients with chronic liver disease. Indian J Gastroenterol. 2003 Nov-Dec;22(6):221-3.

[6] Chakrabarti P, Zullo A, Hassan C, Pandit A, Chowdhury A, Santra A, Hazra B, Morini S,Roy T. Helicobacter pyroli, gastric juice, and arterial ammonia levels in patients with cirrhosis. J Clin Gastroenterol.2002 May-Jun;34(5):578-81.

[7] Gonçalves PL, Gonçalves CS, Pereira FE. Mortality from liver cirrhosis in Espírito Santo State, Brazil. Cad Saude Publica. 2014 Jun;30(6):1335-40.

[8] Rao MY, Raghu J, Deshmukh S, Amaravathi KS, Sudhir U. Arterial hypoxemia in patients with cirrhosis of liver. J Assoc Physicians India. 2008 Sep;56:681-4

[9] Terada T, Terasaki S, Nakanuma Y. A clinicopathologic study of adenomatous hyperplasia of the liver in 209 consecutive cirrhotic livers examined by autopsy. Cancer. 1993 Sep 1;72(5):1551-6.

[10] Pfeiffer RF. Wilson's Disease. Semin Neurol. 2007 Apr;27(2):123-32.

[11]Das K, Kar P. Non-alcoholic steatohepatitis. J Assoc Physicians India. 2005 Mar;53:195-9

[12] Grønbaek M, Jensen MK, Johansen D, Sørensen TI, Becker U. Intake of beer, wine and spirits and risk of heavy drinking and alcoholic cirrhosis. Biol Res.2004;37(2):195-200

[13] Van Waes L, Lieber CS. Glutamate dehydrogenase: a reliable marker of liver cell necrosis in the alcoholic. Br Med J. 1977 Dec 10;2(6101):1508-10

[14] Marsha Y Morgan,Shelia Sherlock. Sex related Differences among 100 patients with alcoholic liver diseases. British medical J.1977;1:939-941.

[15] Basra G, Basra S, Parupudi S. Symptoms and signs of acute alcoholic hepatitis. World J Hepatol 2011; 3(5): 118-120

[16] Sivanathan V, Kittner JM, Sprinzl MF, Weinmann A, Koch S, Wiltink J,Nguyen-Tat M, Marquardt JU, Wörns MA, Zimmermann T, Lang H, Galle PR, Schattenberg JM. [Etiology and complications of liver cirrhosis: data from a German centre]. Dtsch Med Wochenschr. 2014 Sep;139(36):1758-62.

[17] Kim JH et al. Clinical significance of serum sodium level in liver cirrhosis. The Korean Journal of Internal Medicine 2009 Jun ; 24(2):106-112.

[18] Spahr L, Rubbia-Brandt L, Genevay M, Hadengue A, Giostra E. Early liver biopsy, intraparenchymal cholestasis, and prognosis in patients with alcoholic steatohepatitis. BMC Gastroenterol. 2011 Oct 28;11:115.

[19] Angeli P, Wong F, Watson H, Ginès P; CAPPS Investigators. Hyponatremia in cirrhosis: Results of a patient population survey. Hepatology. 2006 Dec;44(6):1535-42.

[20] Shaikh S, Mal G, Khalid S, Baloch GH, Akbar Y. Frequency of hyponatraemia and its influence on liver cirrhosis-related complications. J Pak Med Assoc. 2010 Feb;60(2):116-20.

[21] Samonakis DN, Koulentaki M, Coucoutsi C, Augoustaki A,Baritaki C, Digenakis E, Papiamonis N, Fragaki M, Matrella E, Tzardi M, Kouroumalis EA. Clinical outcomes of compensated and decompensated cirrhosis: A long term study. World J Hepatol 2014; 6(7): 504-512.

[22] Gentilini P, Laffi G, La Villa G, Romanelli RG, Buzzelli G, Casini-Raggi V, Melani L, Mazzanti R, Riccardi D, Pinzani M, Zignego AL. Long course and prognostic factors of virus-induced cirrhosis of the liver. Am J Gastroenterol. 1997 Jan;92(1):66-72.

[23] Svetel M, Pekmezović T, Petrović I, Tomić A, Kresojević N, Jesić R, Kazić S, Raicević R, Stefanović D, Delibasić N, Zivanović D, Dordević M, Kostić VS. Long-term outcome in Serbian patients with Wilson disease. Eur J Neurol. 2009 Jul;16(7):852-7.