

Research Article

Prevalence of Chronic Liver Diseases and Cirrhosis in Tiruchirappalli District of Tamil Nadu, India: A Cross-Sectional Study

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Abstract

A partial epidemiological study was conducted by observing patients with liver diseases during January 2018 to June 2021 in a hospital in Tiruchirappalli district of South India. A total of 107 cases were recorded, where prevalence was highest in males, 86 cases (80%) compared to females, 21 cases (20%). The incidence was found most common in the age group between 31 to 50 years. Observations of this study in Tiruchirappalli district is the first information report and would aid in the development of public health care significance with a culturally relevant liver care policy for the mankind. Due to an increase in the incidence rate of liver diseases, there is an immediate need in further investigation on herbal alternative as a source of remedy for liver and its associated diseases which will be taken as future prospect of the present study.

Keywords: Epidemiology, cirrhosis, hepatitis, chronic liver diseases, Tiruchirappalli.

Introduction

Chronic liver diseases prevail worldwide, invariable of age, sex, region or race. The epidemic of obesity and development of new treatment towards liver associated diseases contribute to its severity and occurrence among the population. The global burden of liver diseases is mostly due to aetiology of Chronic Liver Disease (CLD), Chronic Hepatitis-B (CHB), Hepatitis C Virus (HCV), Liver Cirrhosis (LC), Alcoholic Liver Disease (ALD) and Non-Alcoholic Fatty Liver Disease (NAFLD) (Asrani *et al.*, 2019; Sepanlao *et al.*, 2020). Liver cirrhosis represents the terminal stage of chronic active liver diseases based on different aetiologies, characterized by fibrosis and structural distortion of liver with regenerative nodules showing diverse clinical manifestation and complications. It includes nutritive toxic (alcoholic hepatitis and drug induced hepatitis), viral-immunological (autoimmune hepatitis) and parasitic injuries (*Schistosoma* cirrhosis and fibrosis). The current burden needs reliable predictions where clinical, scientific and policy purposes are essential. According to the recommendation of WHO expert group, "Cirrhosis of the liver is defined as a diffuse process characterized by fibrosis and the conversion of normal liver into structurally abnormal nodules" (Anthony *et al.*, 1978; Cheemerla and Balakrishnan, 2021).

In 2010, about 1,88,575 (109,748 to 303,989) liver cirrhosis deaths in India was estimated, accounting for almost one-fifth (18.3%) of the global liver cirrhosis death toll. Cirrhosis mortality has been steadily increasing in India since 1980, where alcohol consumption is the major reason for prevalence of hepatitis-B, hepatitis-C and diabetes. Also, it registers a major risk factor for non-alcoholic fatty liver disease (NAFLD) among the population (Mokdad *et al.*, 2014). The progression of cirrhosis differs significantly from person to person due to several factors. Its incidence usually remains unidentified, but it can be detected based on three basic histologic criteria, which include a diffuse disorder, fibrosis, and irregular nodules replacing normal functioning of the organ. Deposition of fibrous tissue at sites of liver cell necrosis is the first phase, which connects portal and central areas to another in early stages. Cirrhosis can be morphologically classified as micronodular cirrhosis (uniform nodules <3 mm in diameter), macronodular cirrhosis (irregular nodules with a variation >3 mm in diameter) and mixed cirrhosis (when features of both micronodular and macronodular cirrhosis are present). Aetiologically, cirrhosis can be classified based on viral (hepatitis B, C, and D), toxins (alcohol, drugs), autoimmune (autoimmune hepatitis), cholestatic (primary biliary cholangitis, primary sclerosing cholangitis), vascular (Budd-Chiari syndrome, sinusoidal obstruction syndrome,

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cardiac cirrhosis) and metabolic (hemochromatosis, NASH, Wilson disease, alpha-1 antitrypsin deficiency, cryptogenic cirrhosis) diseases (Sharma and John, 2021). A cross-sectional study of hospital-based prevalence studies on chronic liver diseases and liver cirrhosis is helpful in assessing the true nature of problem, magnitude of diseases in a community and aids in devising preventive measures. Since, there were no report on the incidence of chronic liver diseases and its associated diseases like liver cirrhosis in and around the district of Tiruchirappalli. An attempt was made to study the epidemiology of the disease in patients attending in CSI Mission General Hospital, a local community-based hospital in Tiruchirappalli region, Tamil Nadu, India, to estimate the burden of the liver disease and highlight the cirrhosis rate in selected area of study.

Material and methods

Study population: The data for this study was obtained from In-Patient (IP) and Out-Patients (OP) attending the CSI Mission General Hospital in Woraiyur, Tiruchirappalli. A total number of 107 cases were studied during the period of three years from January 2018 to June 2021, for all the cases the predesigned and prescheduled proforma have been used, which include detailed history, general physical examination, personal habits, and detailed systemic examination.

Experimental parameters: The demographic status of the patients was divided into urban and rural categories. An account of case record form and questionnaire was prepared for collection of data. The privacy and confidentiality of the patients were maintained at every level of the study. The record framework of cases was included, based on age, gender, demography, morphology of cirrhosis in each patients and associated liver diseases and conditions namely alcoholic liver disease, chronic hepatitis B, hepatitis C, elevated blood cholesterol, elevated liver enzymes, hypertension, HCV antibody positivity, insulin resistance, NAFLD, obesity (BMI >30) and type 2 diabetes.

Results and discussion

A survey was made to study on the prevalent diseases among the people in Tiruchirappalli district, Tamil Nadu, India. The CSI Mission General Hospital, which was selected for the epidemiological study, is one of the prime centres of the city where people in and around the district visit for treatment of various diseases. Patients complaining on liver diseases includes various associated diseases was targeted in the survey analysis. In the present study, the data was collected for three years from January 2018 to June 2021.

Patients with a history of significant chronic alcohol intake with physical signs of alcoholic liver disease like jaundice, ascites portal hypertension, complications of portal hypertension, positive laboratory and radiological findings were undertaken for the present study. Patients with post-necrotic cirrhosis, hepatitis, Hepatitis C, Hepatitis B, patients with Seropositivity for HIV, patients with any other form of chronic liver diseases, hemochromatosis, and Wilson's disease etc. were also included. Most of the cirrhotic cases were left undiagnosed.

Demographic profile: The total number of chronic liver disease and cirrhosis cases was reported to 107 from January 2018 to June 2021, in which the number of cases was highest in 2020 with 34 cases and with 31 cases in 2019, 23 cases in 2018 and 19 cases and on in 2021 (Fig. 1). Cirrhosis is intermittently seen in young adults. The incidence of cirrhosis in the study area increased with age and it was more prevalent in the age group between 31- 50 years, in which the male predominance was observed exhibiting 63 cases (58.87%). Depending on the underlying aetiology, male population was the most affected by cirrhosis. Alcoholic liver cirrhosis was very common in men (6.54%). Chronic hepatitis B was more common in men (6.54%). Similarly, chronic hepatitis C was more prevalent in men. NAFLD was prevalent among both women and men showing 20.57% of all the cases recorded. Other liver associated conditions such as obesity, type 2 diabetes, hypertension was also observed in which the male predominance was prevalent. The demographic profile of chronic liver disease and cirrhosis prevalence in the city of Tiruchirappalli is shown in Table 1. The sampling incorporated prevalence and incidence as two predominant measures on occurrence of disease.

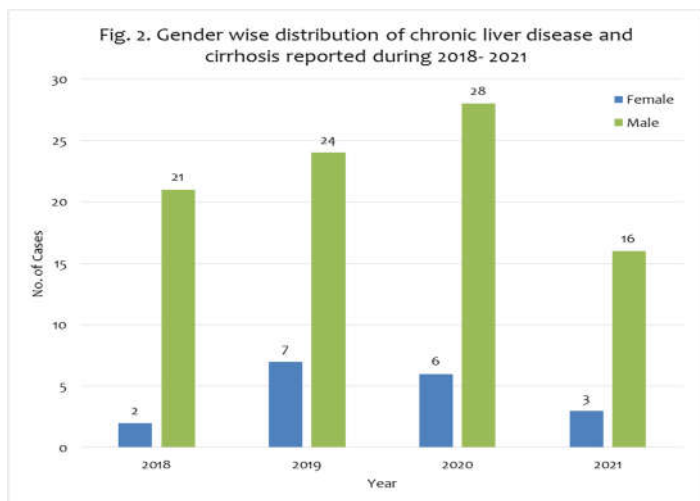
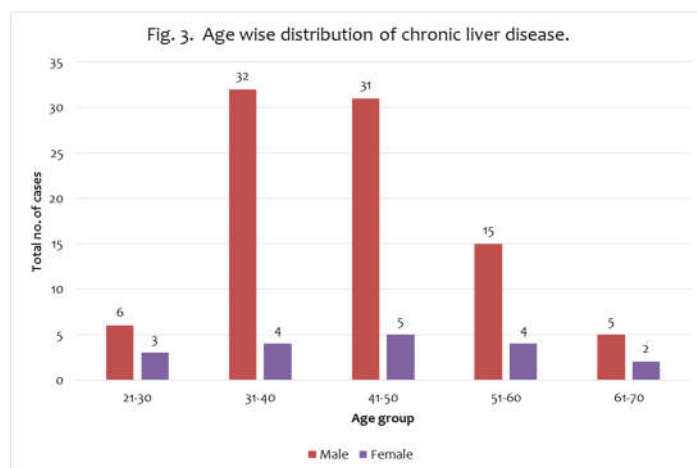
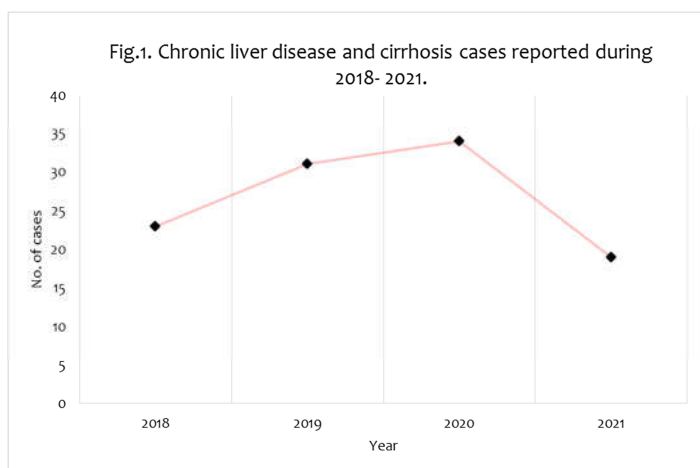
Prevalence: The number of cases increased progressively from 2018 to 2021. Of these, three and a half years, the maximum of 34 cases was reported in 2020, followed by 31 cases in 2019, 23 cases in 2018 and 19 cases 2021 were observed. Among the 107 cases of liver cirrhosis, the prevalence of this condition was highest of 86 cases in males (80%) compared to females (20%) with 21 cases (Fig. 2). The morphological characteristic features of liver cirrhosis were studied. Among the 107 people, the incidence of micro nodular cirrhosis was high with 60 cases (56%) when compared to macro nodular cirrhosis in which 47 cases (44%) were recorded.

Incidence: Ethnicity and age play an important role in the fibro genic process leading to cirrhosis, where age is an important factor for the incidence of liver cirrhosis among the living population.

Table 1. Demographic profile of Cirrhosis and Chronic liver disease prevalence in the city of Tiruchirappalli between the years 2018-2021.

	January 2018 - December 2018				January 2019 - December 2019				January 2020 - December 2020				January 2021- June 2021			
	Male		Female		Male		Female		Male		Female		Male		Female	
	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)
Sample N	21	19.62	2	1.9	24	22.42	7	6.54	28	26.2	6	5.6	16	15	3	2.8
Age: 21- 30 years	1	4.77	-	-	2	8.33	1	14.3	2	7.14	1	16.7	1	6.25	1	33.33
Age: 31- 40 years	8	38.1	1	50	9	37.5	1	14.3	10	35.7	1	16.7	5	31.25	1	33.33
Age: 41- 50 years	10	47.6	-	-	8	33.33	3	42.9	8	28.5	2	33.3	5	31.25	-	-
Age: 51- 60 years	2	9.52	1	50	4	16.7	1	14.5	6	21.43	1	16.7	3	18.75	1	33.34
Age: 61- 70 years	-	-	-	-	1	4.17	1	14.5	2	7.14	1	16.6	2	12.5	-	-
Alcoholic liver disease	1	0.93	-	-	2	1.87	-	-	3	2.8	-	-	1	0.93	-	-
Chronic hepatitis B	3	2.8	-	-	1	0.93	1	0.93	1	0.93	-	-	1	0.93	-	-
Chronic hepatitis C	3	2.8	-	-	1	0.93	1	0.93	2	1.87	-	-	-	-	1	0.93
Elevated blood cholesterol	4	3.74	-	-	2	1.87	1	0.93	1	0.93	-	-	1	0.93	-	-
Elevated liver enzymes	-	-	-	-	3	2.8	-	-	2	1.87	1	0.93	-	-	-	-
Hypertension	-	-	-	-	-	-	-	-	1	0.93	-	-	-	-	-	-
HCV antibody positivity	-	-	-	-	-	-	-	-	1	0.93	-	-	1	0.93	1	0.93
Insulin resistance	-	-	-	-	4	3.74	1	0.93	4	3.74	1	0.93	-	-	-	-
NAFLD	5	4.67	1	0.93	4	3.74	-	-	4	3.74	2	1.87	6	5.61	-	-
Obesity (BMI>30)	3	2.8	1	0.93	3	2.8	1	0.93	5	4.67	1	0.93	3	2.8	1	0.93
Type 2 diabetes	2	1.87	-	-	4	3.74	2	1.87	4	3.74	1	0.93	3	2.8	-	-

NAFLD- Non-Alcoholic Fatty Liver Disease; HCV- Hepatitis C Virus; BMI- Body Mass Index.



The present study proved that the age group between 41-50 years showed the highest prevalence of 38 cases (35.5%). The age group 31-40 years showed the next highest prevalence with 36 cases (33.6%) and in the age group of 51-60 years, the number of cases was 20 (18.7%).

The prevalence of the disease was very low (3.7%) in elderly people in the age group of 61-70 years (4 cases) (Fig. 3). The place of habitation is also one of the major criteria for the pervasiveness rate of liver cirrhosis. From the present study, it was observed that the people who were in the rural area were affected maximum by liver cirrhosis with 73 cases (68%). Whereas, the people who reside in the urban area were less prone to this disease (34 cases) (32%). Therefore, it is inferred that the rural people were affected more when compared to the urban residents, which might be due to less health awareness among a group of people. Current design of the study determined the clinical and aetiological associated features relating to CLD in Tiruchirappalli district, Tamil Nadu, India. This helps in formulating health care policy, provision of resources and alternative remedy for liver diseases in the regional study area. A predominant aetiology showed a significant regional difference among the target group where diabetes, obesity and socio-economic divergences describes the nature of the disease. A study comprises of 107 cases of liver cirrhosis from January 2018 to June 2021 was developed.

Out of 107 cases, 74 cases were in the age group 31-50 years, and mean age of cirrhosis was 40 years. An etiological study of chronic liver diseases in eleven regions of all over India, has reported that 13014 CLD cases of which 33.9% represented cirrhosis in the median age group of 43 years. among the CLD mainly leads to cirrhosis and predominant cases of Hepatitis C in north; Hepatitis-B in east and south; ALD in north-east; NAFLD in west parts of India where a significant interregional difference occurred (Mukherjee *et al.*, 2017). Cirrhosis was the commonest finding comprising 25% of the cases, followed by chronic hepatitis 22% in a study conducted on 100 medico-legal autopsy cases brought to the mortuary of Regional Institute of Medical Sciences, Imphal (Devi *et al.*, 2013). A decade earlier, a study was conducted in government medical college, Patiala of one hundred specimens of liver of the deceased (>40 years of age) where 42.8% cases of cirrhosis occurred in the age group between 41-50 years, also an autopsy report revealed 100 cases of liver specimens exhibited cirrhosis in 13 males and one female. Male predominance of liver disease was seen in the present study showing 84% of the reported cases (Bal *et al.*, 2004). Most commonly liver cirrhosis is high, in the rural area population i.e., 62 cases as compared to urban area population is 36 cases similar results are observed (Sundaram *et al.*, 1984). Morphologically, three variants of cirrhosis micro-nodular cirrhosis <0.3 mm, macro-nodular cirrhosis >3 mm and mixed nodular cirrhosis has both micro and macro-nodular features were also reported. In the present study, liver on gross examination showed micronodular <0.3 mm in 60 cases (56.07%) and macro-nodularity >0.3 mm in 47 cases (43.93%) whereas, mixed nodularity was observed (Agrawal and Vaiphei, 2014). Cirrhosis and its complications represent the end in the spectrum of chronic liver diseases with encephalopathy, varices, and peritonitis complications (Sivanathan *et al.*, 2014). The natural history of cirrhosis is classically characterized by the asymptomatic phase termed compensated cirrhosis, followed by the development of complications from portal hypertension and liver dysfunction termed decompensated cirrhosis. Cirrhosis related deaths have been estimated to increase and might mark as 12th leading causal death in 2020 (Murray and Lopez, 1997; Byass, 2014).

Conclusion

The mortality rate of liver cirrhosis accounts for a growing and substantial disease burden worldwide each year, causing more than one million deaths in 2010. The current study based on epidemiology of liver cirrhosis according to age, sex, and prevalence in relation to urban, rural area and morphological patterns of liver cirrhosis in Tiruchirappalli district is the first-hand information to be reported. The incidence of liver cirrhosis is the most common in the age group between 31 to 50 years.

Mean age of mortality was 43.67 years. Male were more affected than the females in the present study with 100 cases, the incidence of micro-nodular cirrhosis is 56%, macro-nodular cirrhosis is 44%. Males were more affected than the females, majority of the cases are seen in the rural patients compared to urban patients. The disease trend over a certain period maintains surveillance on fluctuation of its various aspects, but also focuses its importance on a country's public health system, including social changes. Ultimately it leads to other measures for its control through agencies such as governmental and non-governmental to prioritize funds. Especially in country like India, an optimal, cost-effective use of control measures in the country's overall disease scenario helps in knowing the exact burden of the disease. In this concern, formulating effective policies for optimal use of liver transplant on a public health basis is much important. Therefore, researchers, clinicians and public health officials attempt to develop effective prevention and treatment approaches regarding various liver conditions among the population. Consequently, the present epidemiological investigation provides a wide trend of evidence to focus on the future prospect on exploration of herbal alternative for the treatment of liver diseases.

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