e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2024; 16(3); 1118-1124

Original Research Article

Steatosis and Other Pathological Changes in Liver: An Autopsy Study

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Received: 25-12-2023 / Revised: 23-01-2024 / Accepted: 26-02-2024
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Conflict of interest: Nil

Abstract:

Introduction: Liver is known as "the custodian of milieu interior". Hence it is vulnerable to variety of metabolic toxicity, microbial and circulatory insults. It may be primary or secondary to alcoholism, drug toxicity, environmental exposure and habits. Most of liver diseases which are silent in nature are detected incidentally, during work-up for other diseases or diagnosed only at autopsy. We aim to determine the prevalence of silent liver diseases in autopsy examination.

Materials and Methods: This descriptive study was conducted in the Department of Pathology and Forensic medicine, Government Medical College, Kottayam. Liver specimens were collected from 150 cases as a part of examination of multiple viscera, over a period of 1.5 years. All the specimen were examined grossly and sections from representative area were submitted for processing, sectioned and stained with Hematoxylin and Eosin stain and special stains in the relevant cases.

Results: Out of 150 specimens, we obtained cases with normal liver tissue, inflammatory/ reactive and neoplastic diseases. The lesions reported were steatosis, normal liver, venous congestion, cirrhosis, malignancy, Alcoholic hepatitis, granulomatous lesion, Von Meyenberg Complex and cavernous hemangioma. Maximum cases were in the age group 41-50 years. Liver diseases predominated in males, with male: female ratio of 2.6:1. Steatosis (58.7%) was the most common finding.

Conclusion: Silent diseases of the liver are not uncommon. Autopsy examination of liver is very helpful to identify silent liver diseases like fatty change, cirrhosis, venous congestion and rarely malignant tumours.

Keywords: Liver autopsy, Fatty change, Steatosis, Cirrhosis of liver.

Introduction

Liver is vulnerable to a wide variety of metabolic, toxic, microbial, circulatory and neoplastic insults. However enormous functional reserve of the liver can mask the clinical impact with the exception of Acute Liver Failure. Most of liver pathology is an insidious process in which clinical detection and symptoms of hepatic decompensation can occur after day to years after the onset of injury [1].

It can be either primary as in alcoholic liver diseases, chronic hepatitis or secondary as in metabolic disorders like dyslipidemia, diabetes mellitus and cardiac decompensation [2]. Fatty liver or Steatosis is the intra cellular accumulation of neutral fat within the hepatocytes or other lipids like triglyceride and fatty acids or less commonly cholesterolesters and phospholipids in liver [3]. Fatty liver is present in >90% of daily as well as binge drinkers [4]. Though alcohol is the most common cause of fatty liver, many other contribute to its occurrence most important being NAFLD (Non Alcoholic Fatty Liver Diseases) which is the most common chronic liver diseases in many part of world [1].

NAFLD is a form of hepatitis resembling alcoholic liver diseases but seen in non-alcoholics, it is strongly associated with overweight/ obesity and insulin resistance though it can occur in lean individuals as well. NAFLD is mostly seen in young patients with obesity, dyslipidemia [1]. Fatty liver

being the most common and earliest change of liver injury can progress to hepatitis, cirrhosis or to the extreme of primary liver cancer. In clinical set up the diagnosis of fatty liver is often made with the history, physical examination and supportive laboratory data but many of the chronic liver diseases, even in advanced stages, may not show prominent clinical signs or symptoms, so they either go undiagnosed or are found incidentally during general health check-up or during surgery or autopsy [5].

Autopsy specimens can show many gross and microscopic changes varying from fatty change, cirrhosis, and abscess, infections like hydatid diseases, amoebiasis and malignancy [4]. Thus, the autopsy examination of liver can be useful to identify the cause of death, sometimes to identify silent liver disease and may be helpful in better understanding of liver pathology by autopsy. However, there have been very few studies in this part of the world, in this particular area.

The present study is aimed to determine the proportion of fatty liver and other histopathological lesions of liver in autopsy specimens. As there are limited studies published about the histopathological changes in autopsy specimen, we are trying to find out the same in our clinical setting.

Material and Methods

This is a descriptive study conducted from February 2019 to August 2020 in random continuous sampling of 150 liver autopsy specimens received in Department of Pathology, Govt. Medical College, Kottayam, kerala India during the study period of 18 months.

Sample size:

Sample size was determined using the formula

Sample Size, $\mathbf{N = \frac{Z\alpha^2 pq}{d^2}}$

Zα = 1.96 at 95% Cl

p = prevalence/ proportion in previous study

q = 100-p

d = precision/ allowance error

Proportion of autopsy cases which showed fatty change in previous study conducted by M.S Bal et al [2] is 39%

So, p= 39, q=100-39= **61**

Taking allowable error as 20%,

Sample size, N = Zα2pq/d2 = (1.96)2 ×39×61/(7.8)2 = 150

Calculated sample size is 150

Inclusion criteria: All liver specimens received as a part of autopsy and submitted as autopsy specimen at department of pathology

Exclusion criteria: Specimen showing significant autolytic changes.

Study tools:

1. Instruments to take bits of tissues to be studied.
2. Reagents for tissue processing.
3. Instruments for making paraffin blocks and cutting thin sections from it.
4. Glass slides and cover slips for mounting.
5. Microscope.
6. Eosin- Haematoxyline staining.
7. Special stains- Reticulin, Van Gieson, Periodic acid Schiff (PAS) and Congo red in selected cases.
8. Detailed proforma for each case.

Study procedure: The liver specimens were mostly received as a part of examination of multiple viscera, in each case clinical history including age, sex, clinical findings, food habits with special reference to history of alcohol usage, suspected cause of death and post mortem findings were obtained from post-mortem requisition forms. Gross examination of specimen was done as regards the weight, surface, capsule, colour, consistency etc.

All specimens were fixed in 10% buffered formalin & embedded in paraffin. Sections were taken from paraffin embedded blocks and stained with H&E for routine examination and special stains were done in a few cases wherever required. All the slides were examined under microscope and the findings recorded and analyzed.

Data management and analysis: The data was entered in Microsoft excel and further statistical analysis done using SPSS software (version 22).

Consent: This study was conducted on the liver specimen received in the Department of Pathology as a part of autopsy study. Hence implied consent was present.

Results

The descriptive study was conducted on 150 autopsy liver specimens received in the Department of Pathology, Government Medical College, kottayam during the study period of 18 months. Among which 109 were males and 41 were females, mean age distribution was 47.87 years and mean weight was 1341gms.

Out of 150 cases, 36 had history of alcohol intake, 46 had no history of alcohol consumption, while for 68 cases no data was available.

The major histopathological findings were isolated steatosis (29%) while the total proportion of steatosis 88(58.7%), followed by normal liver (26%), other findings which were seen in combination included congestion, cirrhosis, granulomatous lesion, malignant neoplasm, cavernous hemangioma, granulomatous and alcoholic hepatitis and von meyenberg complex. There were significantly high steatotic changes in the age interval between 41-50years, male 66% and in alcoholics 95% as compared to non-alcoholics 52%. Maximum cases had mixed vesicular pattern of steatosis followed by macrovesicular pattern.

Cirrhotic changes were seen in 22 cases, mostly grade II steatosis in 8 cases. The most common cause of death was natural death (24%), followed by fatal accidents non vehicle related (21.3%), road traffic accident (20.7%), hanging (19.3%), poisoning (11.3%) and drowning (3.3%)

Table 1: Age distribution of study group (N=150)

Age	Frequency	Percentage (%)
10-20	3	2.00
21-30	27	18.00
31-40	23	15.33
41-50	35	23.33
51-60	24	16.00
61-70	24	16.00
71-80	12	8.00
>80	2	1.33
Total	150	100.00

Table 2: Distribution of weight of liver in grams (N= 150)

Weight (in gms)	Frequency	Percentage (%)
<1000	6	4.00
1001-1500	106	70.67
1501-2000	38	25.33
2001-2500	0	0.00
>2500	0	0.00
Total	150	100.00

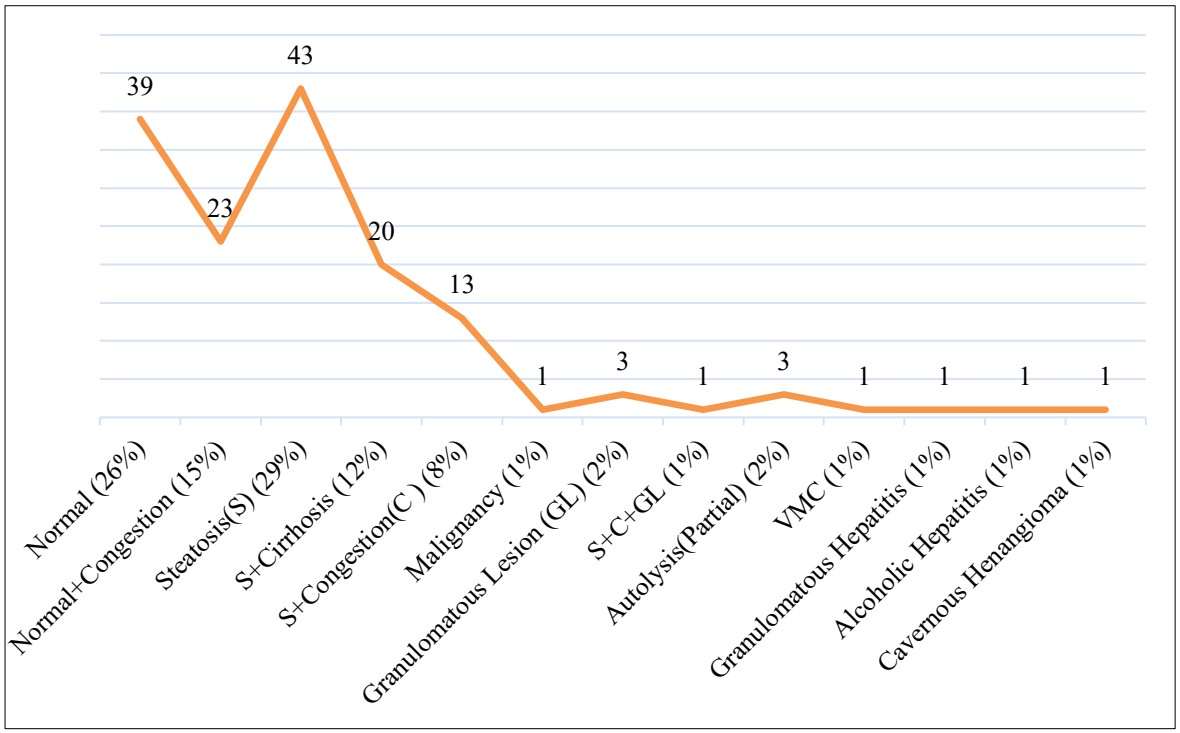

Figure 1: Frequency of Histopathological findings

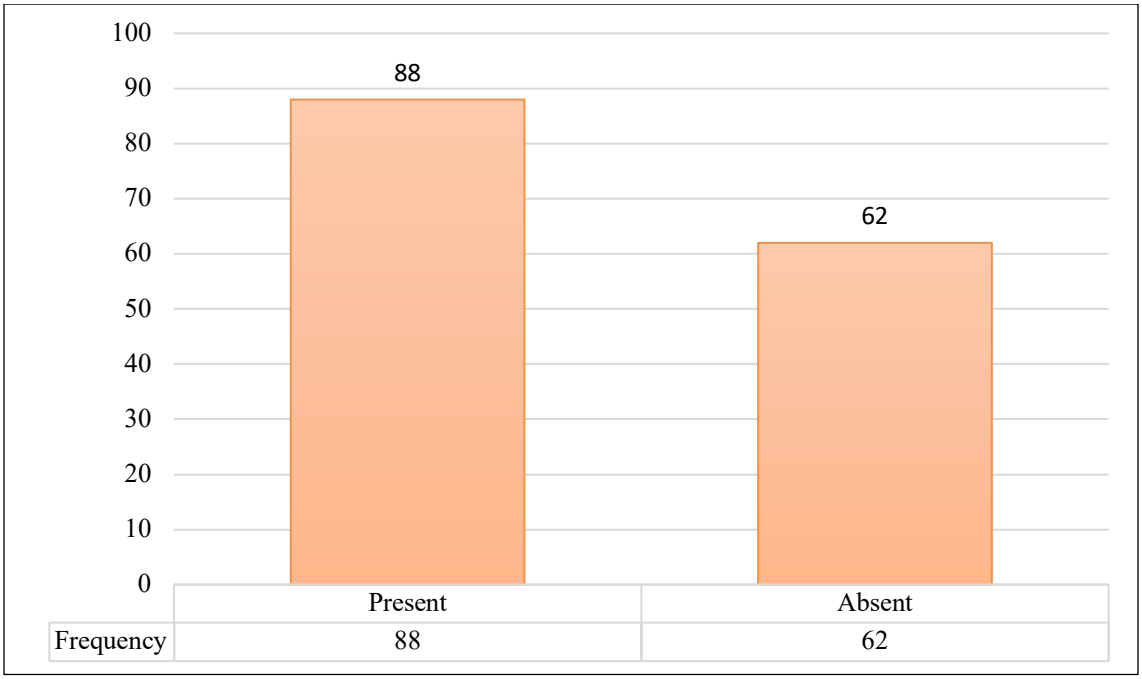

Figure 2: Proportion of steatosis

Table 3: Distribution of Steatosis among various age groups

Age Interval	Present	Absent
10-20	2	1
21-30	8	19
31-40	13	10
41-50	28	7
51-60	17	7
61-70	16	8
71-80	3	9
>80	1	1
Total	88	62

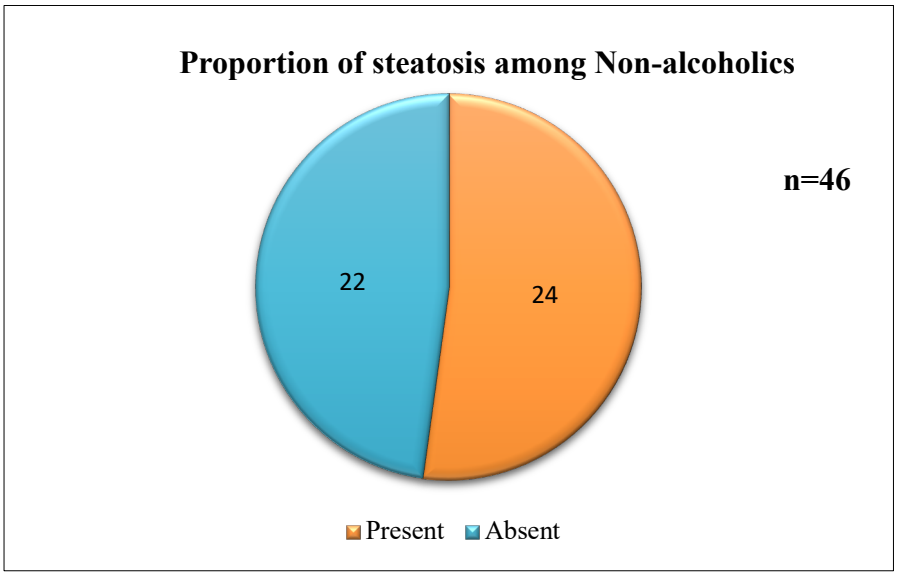

Figure 3: Non-Alcoholic [n=46] individuals having steatosis

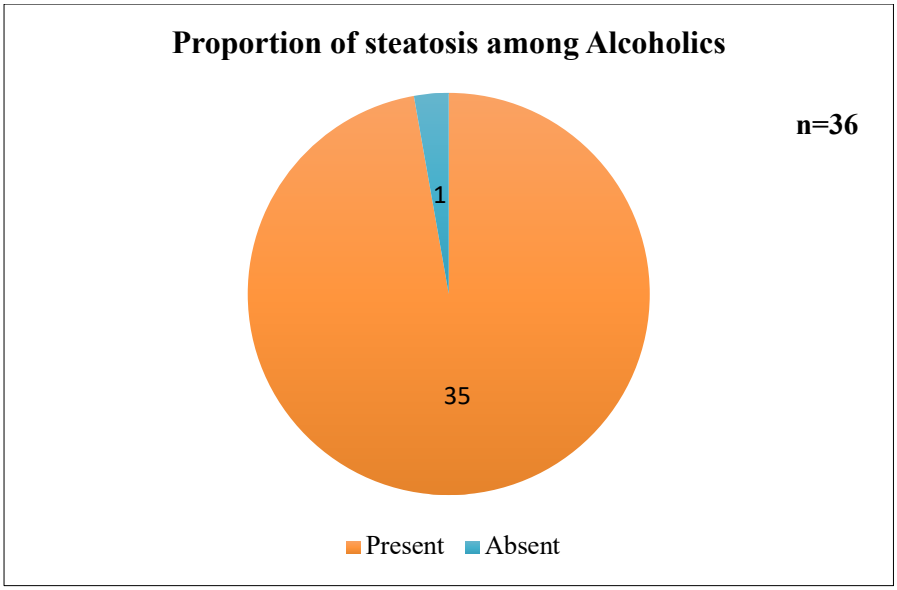

Figure 4: Alcoholic [n=36] individuals having steatosis

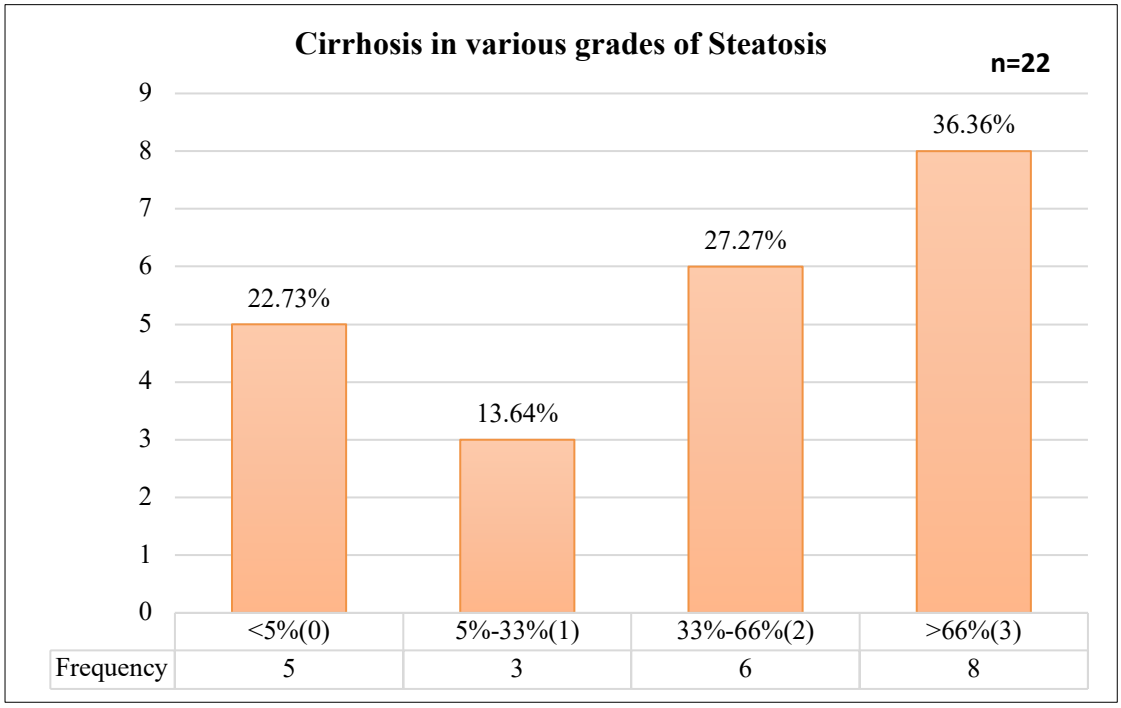

Figure 5: Distribution of cirrhosis in various grades of steatosis

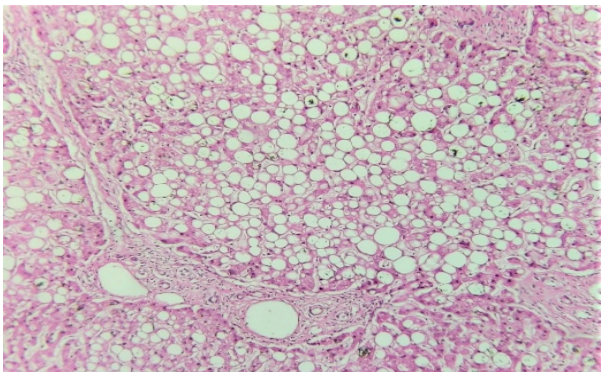

Figure 6: Steatosis (H&E, 10X)

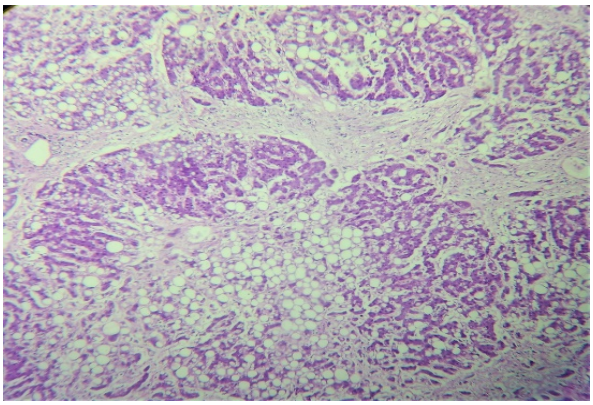

Figure 7: Cirrhotic nodule (H&E, 10X)

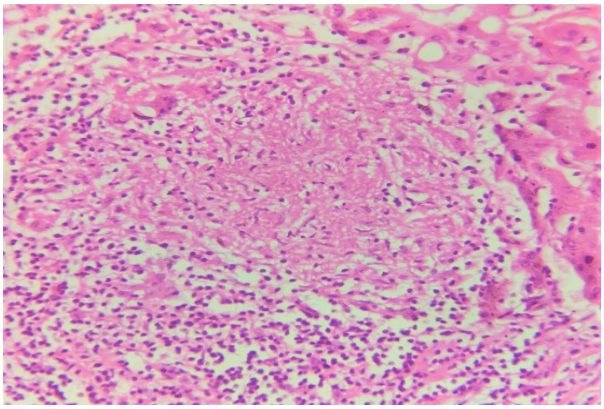

Figure 8: Granuloma (H&E, 10X)

Discussion

Majority of the chronic liver diseases, even in advance stages may cause no prominent clinical signs or symptoms. The underlying cause of chronic liver diseases vary in different geographic areas, ethnicity, socioeconomic status, life style, diet and endemic infections. Many of them either go undiagnosed or are found incidentally during general health check-ups or work up for other diseases, surgery or even at autopsy. The present study was conducted on random 150 liver autopsy specimens, received in the Department of pathology, Government Medical Collage, Kottayam during the study period of 18 months between 28/02/2019 to 28/08/2020. In this study 72.67 % of cases were males and 27.33 % were females. Male predominance was also seen in other studies. This may be attributed to the fact that men are more prone to alcohol consumption. Most cases of steatosis were seen between the age intervals of 41-50 years with a mean age of 47.87years. This finding correlated with the report of Bal et al. and Sotoudehamanesh R et al., [2,6].

The mean weight of the liver was 1341grams, which was similar to the study done by Bal MS et al. The normal weight of the liver ranges between 968-1860gms. Hence by weighing the liver alone, one cannot predict the gross or histological changes. Steatosis was the predominant histopathological finding, which is comparable with Bal MS et al [2] and Behara A et al [5] while normal liver histology predominated in Soudehamanesh R et al. Steatosis occurs due to injury to hepatocytes by agents like alcohol. Such type of injurious agents affecting the liver is more common than expected, according to Mukherjee PS et al. [7].

In the present study, 58.7 % of cases had steatosis which is much higher than the other similar studies; this is because a large percentage of people in this region consumed alcohol which is one of the major causative factors. Regular intake of alcohol between 40-80gm increases the liver weight and frequency of fatty changes in liver [5]. The normal liver histology (26%) was the second most common finding which is comparable with Bal MS et al, while it was steatosis according to Soudehamanesh R et al. This may attribute to the fact in Tehran (Middle East) alcohol is banned.

Among all the steatosis cases, 14% showed cirrhosis, comparable with Bal MS et al and Behara A et al studies. Cirrhosis usually occurs following chronic steatosis. It is due to hepatocyte injury and subsequent healing by fibrosis. It was observed that among alcoholic and non-alcoholic individuals, 97% alcoholics had steatosis which were much

higher than non-alcoholics (52%), this may attribute to the role of alcohol in fatty liver. Four of the cases showed granulomatous lesion. Liver due to its rich blood supply is a common site for miliary tuberculosis [8]. Primary hepatic tuberculosis is rare due to low oxygen tension which is unfavorable for growth of mycobacterium as per Zheng Wu et al., [9]. A case of primary malignant neoplasm was seen. Of the malignant tumors of liver, metastases are more common than primary, however in this case no other primary neoplasm was noted during autopsy [10]. Von Meyenburg complex is an asymptomatic, benign developmental ductal plate malformation of the intrahepatic bile duct which is mostly diagnosed incidentally [11]. A case of cavernous hemangioma was also observed in the study.

Most cases reported in our hospital was natural death (24%), followed by other fatal accidents non-vehicle (21.3%), Road traffic accident (20.7%), hanging (19.3%), poisoning (11.3%) and drowning (3.3%). It was observed that maximum steatosis was seen in death due to hanging (20%) and other non-vehicle fatal accidents (20%), this suggest that steatosis is not an adequate standalone cause of death.

Conclusion

Clinically asymptomatic liver diseases are very common in apparently healthy individuals. In this study, steatosis (58.67%) was the most common histological finding. Maximum cases were in the age group of 41-50years and M:F ratio was 2.6:1. The other common findings are cirrhosis, granulomatous lesion, malignant neoplasm, alcoholic hepatitis, cavernous hemangioma and von meyenberg complex. If not detected early, some may lead to serious outcome while many of these lesions are detected during autopsy only. Many females and non-alcoholics had NAFLD; hence community awareness is highly needed to modify their lifestyle. This study also emphasizes the need to restrict alcohol consumption to prevent pathological changes in liver.

Limitations:

The study was conducted in small sample size; hence it may not reflect the actual pattern of liver diseases in the entire region. Obtaining the history and other clinical details for all the cases from grieving families was not possible. Entire specimens of liver could not be obtained in all cases since tissues had to be sending for toxicology. Pictures of the entire liver were taken to overcome this limitation.

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