

Histopathological expanse of liver disease: Retrospective study in a tertiary care centre

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ABSTRACT

Background: Non-invasive tools cannot replace liver biopsy. Liver biopsy is an investigation for the confirmatory diagnosis of chronic liver diseases and plays a crucial role in deciding line of management of patient **Study design:** It is a descriptive type of retrospective study conducted at Department of Pathology at MGM medical college and hospital, Chh. Sambhajanagar. **Methods and Material:** 150 cases were studied over a period of four years from 1st January 2020- December 2023 and results evaluated from 130 cases as 20 cases excluded due to inadequacy. All histopathological reports of Liver biopsies were retrieved from the record registers of department of pathology. The collected data was entered in Microsoft Excel and analysed using SPSS version 24.0. Analysis of the diagnosis was done with parameters such as age and sex, non-neoplastic and neoplastic lesions. With data representation in form of visual impressions like bar-diagram, pie diagram. **Results:** Results from 130 liver biopsies evaluated. Male preponderance (56.15%) was noted. Commonest age group affected was in 0-10 years. The youngest was 8 months old and the oldest patients affected was 92 years. Liver biopsies and specimens were analysed on morphological basis which showed 53.1% % as non-neoplastic and 46.9% as neoplastic lesions. Among all 130 cases, 52 cases shows Metastatic deposits, 8 cases shows hepatocellular carcinoma, one case show Hepatic adenoma, 18 cases shows Biliary atresia, 3 cases shows Neonatal hepatitis, 6 cases shows Idiopathic adult cirrhosis, 10 cases shows chronic hepatitis, 4 cases shows Autoimmune hepatitis, one case show congenital hepatic fibrosis, cases shows, 3 cases shows non cirrhotic portal fibrosis, 2 cases shows non alcoholic steatohepatitis, 4 cases shows metabolic liver disease, one cases shows Wilson disease, 4 cases shows PFIC, 3 cases shows Overlap syndrome, 10 cases shows cystic lesions.

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INTRODUCTION

Liver is a primary organ for various metabolic activities of the body. It is exposed to various metabolic, toxic, infectious and neoplastic insults.^[1]

In abnormal liver tests not explained by other methods or in evaluation and staging of chronic liver diseases and diagnosing various lesions of liver, liver biopsy serves as a important investigation.^[2]

According to the World Health Organization (WHO) data published in May 2014, the deaths due to liver diseases in India reached to 2.44% of total deaths with the age adjusted death rate of 21.96 per 100,000 populations [3]

While viral hepatitis and alcoholic liver disease are critical to global health, non-alcoholic fatty liver disease (NAFLD) and non-alcoholic steatohepatitis (NASH) have become the leading causes of liver disease.^[4]

Non-invasive tools cannot replace liver biopsy. Liver biopsy is investigation for the confirmatory diagnosis

of chronic liver disease in spite of major advances in diagnostic procedures. ^[5]

Histopathological examination of liver biopsy (LB) is valuable in providing information about liver tissue parenchyma with proper evaluation of the severity of hepatic injury and fibrosis ^[6]

The value of liver biopsy is not merely to determine the degree of fibrosis, rather it draws a detailed map for many important histological findings such as the degree of inflammation, nature of inflammatory cells, distribution of inflammation, status of bile ducts, vasculature, presence of steatosis and deposition and infiltration of liver with different materials like iron, copper. ^[7]

Liver biopsy also useful in the diagnosis of storage disorders like glycogen storage disease.^[8]

Histopathological examination of liver biopsy specimen remains a gold standard for the diagnosis and management of various liver disorders. ^[9]

For further management and treatment of patient, team approach involving clinician, radiological and

histopathological opinion will be the better guide. So histopathological diagnosis can support preliminary diagnosis and play a crucial role in deciding line of management of patient

Aim of the present study is to to determine the histomorphological expanse of liver diseases.

MATERIALS AND METHODS

STUDY DESIGN:

TYPE OF STUDY: Retrospective, descriptive study.

TIME SCALE OF THE STUDY: Four year study- Retrospective study from 1st January 2020- December 2023

STUDY SITE: The study was conducted at MGM Medical College, Chh. Sambhajinagar.

STATISTICAL ANALYSIS: The collected data was entered in Microsoft Excel and analyzed. Also data was represented in the form of visual impression like bar-diagram, pie-diagram, etc.

SAMPLE SIZE: It is Retrospective study, cases recorded in the time scale of study are included. 150 specimens and H & E slides studied, out of which 20 were found inadequate for opinion. Results are evaluated from 130 cases.

METHODOLOGY:

- The study is a Retrospective, Descriptive study.
- The study includes liver biopsies and specimens sent to Pathology department in MGM Medical College, Chh. Sambhajinagar.
- The specimens included were liver biopsies and specimens.
- All the sections were studied by routine paraffin sectioning and Hematoxylin and eosin stain.
- Special stains like Masson trichrome, Periodic Acid-Schiff (PAS) and reticulin were included as and when required to support the diagnosis.
- Immunohistochemistry was included in undifferentiated tumors.

Grouping of these tumors will be done using the International Classification of World Health Organization (2018).

Inclusion criteria:

The study included liver biopsies and liver specimens sent to Pathology Department in MGM Medical College, Chh. Sambhajinagar.

Exclusion criteria: Inadequate biopsy cases and the cases in which no specific pathology detected were excluded while evaluating results.

RESULTS

150 specimens and H & E slides studied, out of which 20 were found inadequate for opinion. Results are evaluated from 130 cases.

Table 1: Age-wise and Sex-wise Distribution of Liver Lesions (N = 130)

Age Group (years)	Male n (%)	Female n (%)	Total n (%)
0-10	22 (30.1)	9 (15.8)	31 (23.8)

11-20	1 (1.4)	2 (3.5)	3 (2.3)
21-30	6 (8.2)	5 (8.8)	11 (8.5)
31-40	7 (9.6)	7 (12.3)	14 (10.8)
41-50	7 (9.6)	5 (8.8)	12 (9.2)
51-60	11 (15.1)	14 (24.6)	25 (19.2)
61-70	7 (9.6)	4 (7.0)	11 (8.5)
71-80	12 (16.4)	9 (15.8)	21 (16.2)
81-90	0 (0.0)	1 (1.8)	1 (0.8)
>90	0 (0.0)	1 (1.8)	1 (0.8)
Total	73 (100)	57 (100)	130 (100)

Chi-square test = 6.05; p-value = 0.537; Not statistically significant

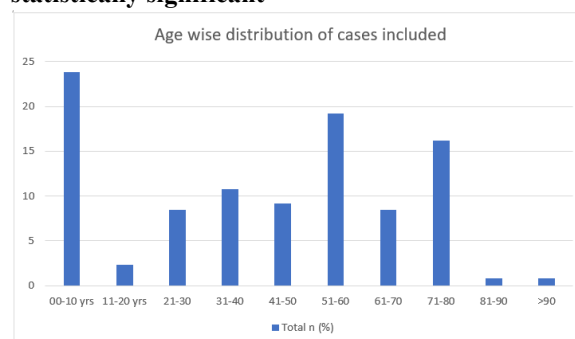
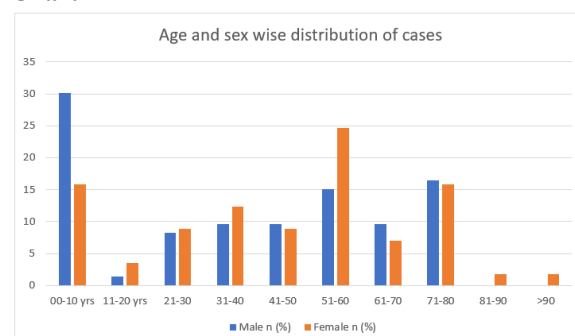


Chart 1



Chart

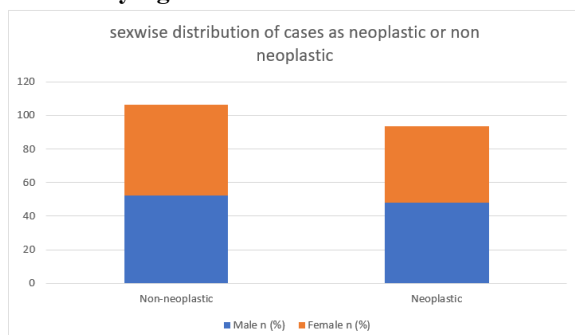
Table 1 shows the age-wise and sex-wise distribution of liver lesions among the 130 study participants. The majority of cases were observed in the 00-10 years age group, accounting for 31 cases (23.8%), with a higher proportion of males (30.1%) compared to females (15.8%). This was followed by the 51-60 years age group with 25 cases (19.2%), where female predominance was noted (24.6%) compared to males (15.1%). The 71-80 years age group also constituted a substantial proportion with 21 cases (16.2%), showing a comparable distribution between males (16.4%) and females (15.8%). Intermediate age groups such as 31-40 years and 41-50 years contributed 10.8% and 9.2% of cases, respectively. Very few cases were observed in the extreme elderly age groups of 81-90 years and above 90 years, each contributing only 0.8% of the total cases. Overall, males constituted 73 cases (56.2%) and females 57 cases (43.8%). Statistical

analysis using the Chi-square test yielded a value of 6.05 with a p-value of 0.537, indicating that there was no statistically significant association between age groups and sex distribution of liver lesions in the study population.

Table 2: Distribution of Liver Lesions According to Disease Type and Sex (N = 130)

Type of Lesion	Male n (%)	Female n (%)	Total n (%)
Non-neoplastic	38 (52.1)	31 (54.4)	69 (53.1)
Neoplastic	35 (47.9)	26 (45.6)	61 (46.9)
Total	73 (100)	57 (100)	130 (100)

Chi-square test = 0.008; p-value = 0.931; Not statistically significant



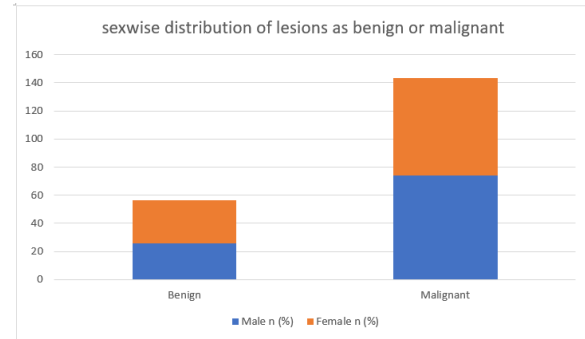
Chart

Table 2 depicts the distribution of liver lesions according to disease type and sex. Among the total cases, non-neoplastic lesions were slightly more common, accounting for 69 cases (53.1%), while neoplastic lesions constituted 61 cases (46.9%). In males, non-neoplastic lesions were observed in 38 cases (52.1%), whereas neoplastic lesions were present in 35 cases (47.9%). Similarly, among females, 31 cases (54.4%) were non-neoplastic and 26 cases (45.6%) were neoplastic. The distribution pattern between males and females was found to be comparable. The Chi-square test value was 0.008 with a p-value of 0.931, suggesting that there was no statistically significant difference in the distribution of neoplastic and non-neoplastic liver lesions between the two sexes.

Table 3: Sex-wise Distribution of Neoplastic Liver Lesions (N = 61)

Neoplastic Category	Male n (%)	Female n (%)	Total n (%)
Benign	9 (25.7)	8 (30.8)	17 (27.9)
Malignant	26 (74.3)	18 (69.2)	44 (72.1)
Total	35 (100)	26 (100)	61 (100)

Chi-square test = 0.21; p-value = 0.646; Not statistically significant



Chart

Table 3 presents the sex-wise distribution of neoplastic liver lesions. Of the total 61 neoplastic cases, the majority were malignant lesions, comprising 44 cases (72.1%), while benign lesions accounted for 17 cases (27.9%). Among males, malignant lesions were predominant with 26 cases (74.3%), compared to 9 cases (25.7%) of benign lesions. Similarly, in females, malignant lesions constituted 18 cases (69.2%), while benign lesions were observed in 8 cases (30.8%). Although a slightly higher proportion of malignant lesions was noted in males, the difference was not statistically significant. The Chi-square test value of 0.21 with a p-value of 0.646 indicates that there was no significant association between sex and the type of neoplastic liver lesions in the study population.

Spectrum of histopathology diagnosis of studied samples :

Sr no	Histopathology diagnosis	No of cases	Percentage
1	Adenocarcinoma unknown primary	13	10
2	Metastatic deposits from known primary	21	16.15
3	Poorly differentiated neoplasm	18	13.84
4	Hepatocellular carcinoma	8	6.15
5	Hepatic adenoma	1	0.76
6	Biliary atresia	18	13.84
7	Neonatal hepatitis	3	2.3
8	Idiopathic Adult cirrhosis	6	4.61
9	Chronic hepatitis (Viral or drug induced)	10	7.69
10	Autoimmune hepatitis	4	3.07
11	Congenital hepatic fibrosis	1	0.76
12	Non cirrhotic portal fibrosis	3	2.30
13	Non alcoholic steatohepatitis	2	1.53

14	Metabolic liver diseases	4	3.07
15	Wilson disease	1	0.76
16	Progressive familial intrahepatic cholestasis	4	3.07
17	Overlap syndrome	3	2.3
18	Simple hepatic cyst	2	1.53
19	Pseudocyst liver	4	3.07
20	Hydatid cyst	4	3.07
	Total	130	100

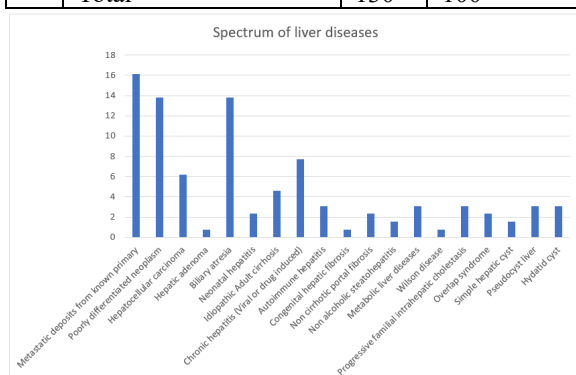


Chart 1

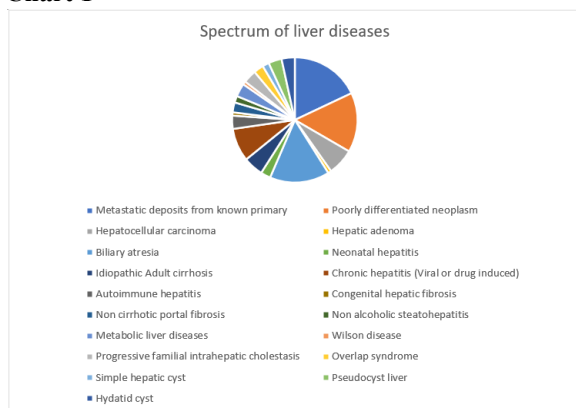


Chart 2

In total 52 cases of metastasis, 13 cases were metastatic deposits from Adenocarcinoma from unknown primary out of which 4 cases were metastatic deposits from cholangiocarcinoma. 21 cases of metastatic deposits were metastatic deposits from known primary out of which 20 cases shown metastatic deposits from adenocarcinoma primary (18 cases from colon, one case from pancreas and one case from breast) and one case was metastatic deposits from neuroendocrine tumour. 18 cases were metastatic deposits of poorly differentiated neoplasm, after immunohistochemistry we found 15 cases were from adenocarcinoma of unknown primary origin, 2 cases were from neuroendocrine tumour of unknown primary and one case from Hepatocellular carcinoma.

In 10 cases of chronic hepatitis, 8 cases were due to viral causes and 2 cases were drug induced.

Out 4 cases of metabolic liver diseases, two cases were of Gaucher disease, one case of Niemann pick disease and one case of Tyrosinemia.

In four cases of progressive familial intrahepatic cholestasis, two cases were PFIC type 1 and two cases were PFIC type 2.

All 3 cases of Overlap syndrome shown features of Primary biliary cholangitis and autoimmune hepatitis.

Microscopy images from different cases are given below

1. Non alcoholic steatohepatitis with cirrhosis (NASH with cirrhosis)

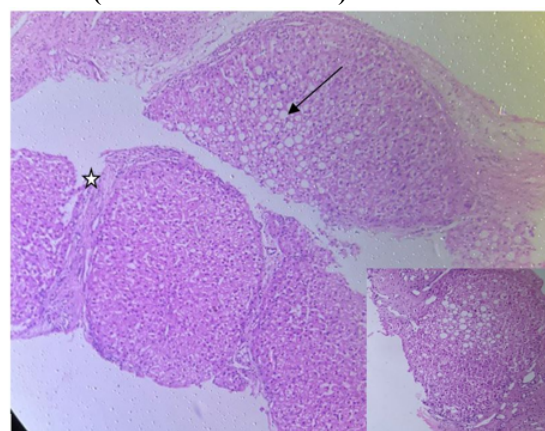


Figure 1: NASH with cirrhosis H & E – 10x with inset 40x

Figure 1 shows macrovesicular steatosis (arrow) and lobular inflammation (star mark)

2. Cirrhosis

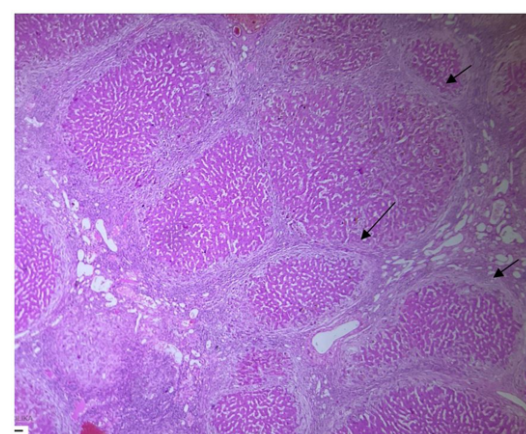


Figure 2: Cirrhosis H&E 40x

Figure 2 shows nodules (arrow) separated by fibrous septa

3. Cirrhosis – Masson's trichome stain

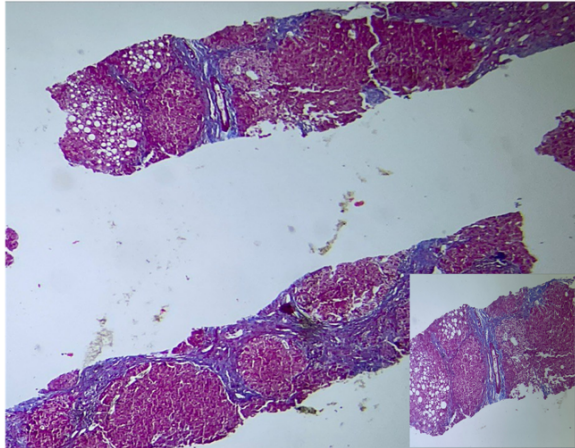


Figure 3: Cirrhosis – Masson's trichome stain 4x with inset 40x

Figure 3 shows collagen appears blue highlighting fibrous septa

4. Autoimmune hepatitis

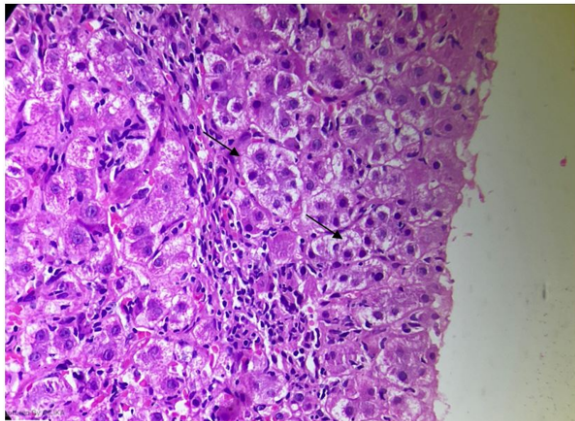


Figure 4 : Autoimmune hepatitis H&E 40x showing rosettes

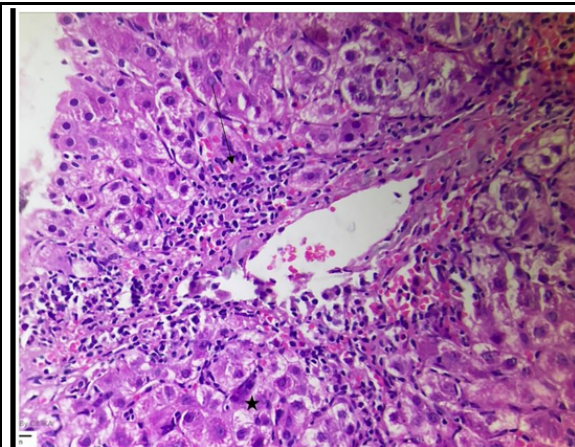


Figure 5 : Autoimmune hepatitis H&E 40x
Figure 5 shows lymphoplasmacytic infiltrate (arrow) and emperipoeliasis at star mark

5. Hydatid cyst

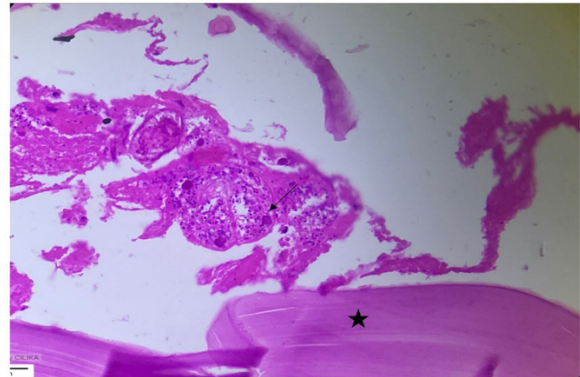


Figure 6: Hydatid cyst H&E 10x

Figure 6 shows showing scolices (arrow) and laminated membrane (star mark)

6. Biliary atresia

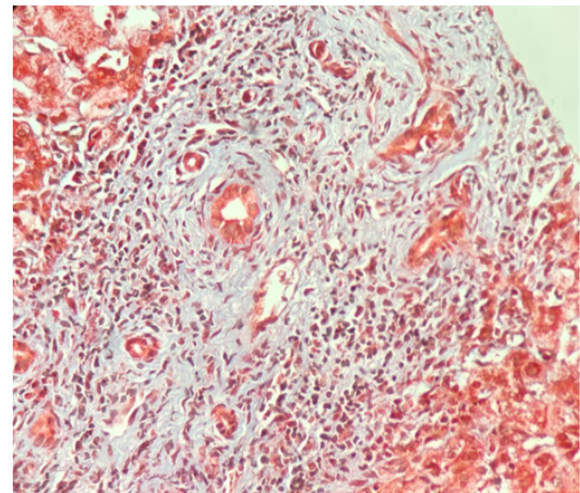


Figure 7: Biliary atresia masson's trichome 40 X

Figure 7 shows periportal fibrosis highlighted by masson stain

7. Gauchers disease

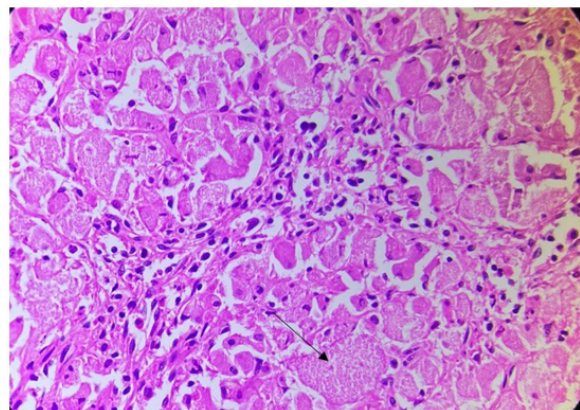


Figure 8: Gauchers disease H&E 40x

Figure 8 shows Gaucher cell (arrow) with characteristic cytoplasm like wrinkled tissue paper appearance

8. Poorly differentiated hepatocellular carcinoma

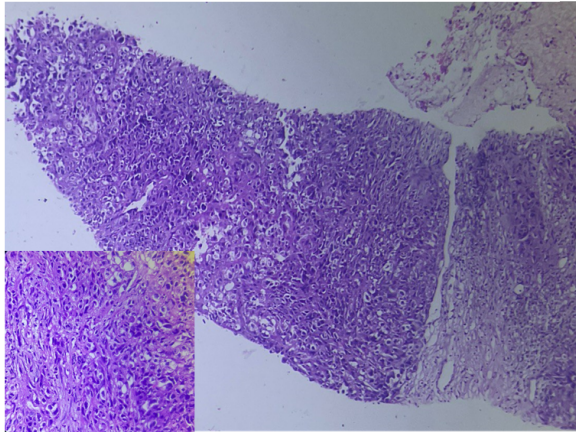


Figure 9: Poorly differentiated hepatocellular carcinoma H&E 4x with inset 40x

9) Hepatocellular carcinoma

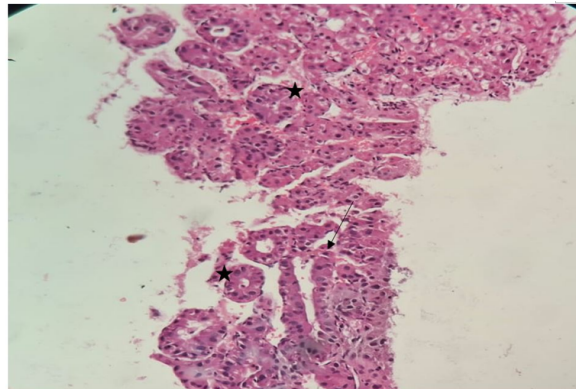


Figure 10: Hepatocellular carcinoma H&E – 10 x
Figure 10: shows tumor cells in acinar arrangement (Star mark) and trabeculae (arrow) and adjacent normal liver parenchyma. 10) Cholangiocarcinoma

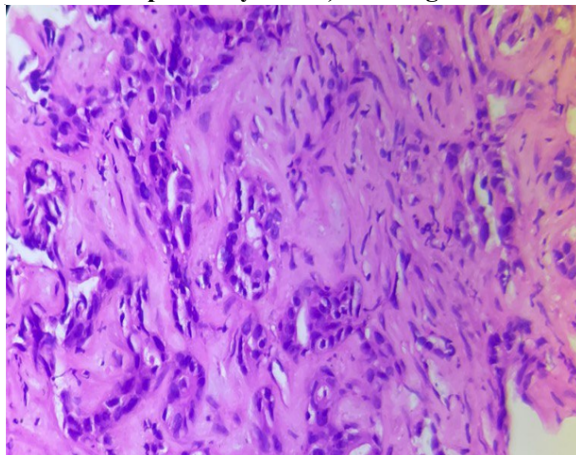


Figure 11: Cholangiocarcinoma H&E 40x
11) Metastatic deposits of adenocarcinoma

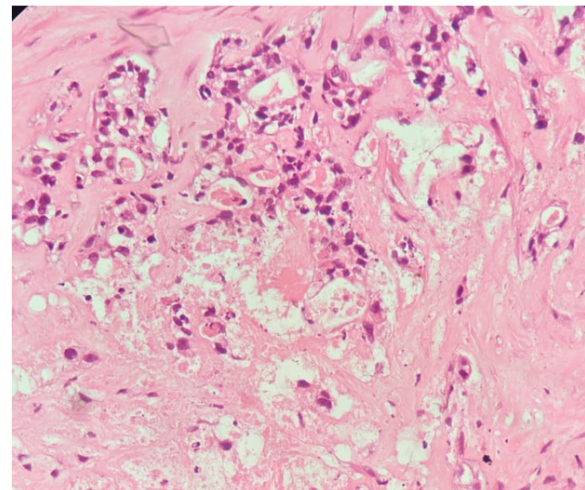


Figure 12: Metastatic deposits of adenocarcinoma H&E 10x

DISCUSSION

In our study, the highest burden was observed in the 0-10 years age group (23.8%), followed by the 51-60 years (19.2%) and 71-80 years (16.2%) age groups. Sharma et al. reported that paediatric and elderly age groups together constituted a substantial proportion of liver lesion cases, with a bimodal age distribution pattern similar to the present study. Sharma et al. documented paediatric liver lesions ranging from 18% to 25%, mainly attributed to congenital and metabolic disorders, which closely aligns with our findings. Additionally, they reported male predominance (55-60%), comparable to the 56.2% male proportion observed in the present study. The lack of statistically significant association between age group and sex distribution in our study ($p = 0.537$) is also consistent with Bansal N et al.(2024)^[10], who observed no gender-based variation across age categories.

In present study, 51-60 years and 61-70 years groups together contributed 27.7% of total cases similar results found in Kuriakose AC et al. study (2023)^[11] in which majority of adult liver lesions clustered in the fifth and sixth decades, accounting for approximately 35-40% of cases. They also noted a higher frequency of lesions in males (58%), which is in close agreement with our study. Their reported chi-square analysis similarly showed no significant gender difference across age categories ($p > 0.05$), reinforcing the trend seen in our data.

53.1% non-neoplastic lesions observed in our study which is comparable to Revathy MS et al.(2023)^[12] study which evaluated the overall distribution of neoplastic and non-neoplastic liver lesions and reported a predominance of non-neoplastic lesions ranging from 50% to 60%.

Our findings where no significant difference was observed between males and females in lesion type distribution ($p = 0.931$) parallels with Patel et al. study

demonstrated that both lesion categories were nearly equally distributed between sexes, with no statistically significant gender association ($p = 0.82$).

46.9% neoplastic lesion rate seen in the present study closely matching with Kamalraj N et al. study (2021)^[13] which documented that neoplastic liver lesions constituted 42-48% of total hepatic biopsies. They also reported that the male-to-female ratio among neoplastic cases was approximately 1.3:1, which aligns with the male predominance noted in our cohort. However, similar to our results, Singh et al. did not observe statistically significant sex-related differences in neoplastic lesion distribution.

In present study, results showed 72.1% malignant neoplasms among tumours which are which are consistent with findings of Poorani R et al. study (2024)^[14] specifically analyzed benign and malignant hepatic tumors and found that malignant lesions accounted for nearly 70-75% of neoplastic liver cases. Our study demonstrated 74.3% male malignant proportion closely resembling male predominance in malignant tumors (around 74%), the in their study. Despite this trend, Gupta et al. also reported no statistically significant sex association ($p > 0.05$), which corresponds to our p-value of 0.646.

Present study observed 27.9% benign lesions comparable to the Okaly GV et al. study (2023)^[15] which reported benign liver tumors constituted approximately 25-30% of neoplastic lesions. Our finding where females constituted 30.8% of benign cases compared to 25.7% in males, although this difference was not statistically significant similar to our finding they observed slightly higher female representation in benign tumours.

Our study observed high pediatric burden and Samant S et al.(2023)^[16] highlighted that pediatric liver lesions were predominantly non-neoplastic in nature, accounting for nearly 65% of childhood liver biopsies. They also reported no significant gender variation among pediatric cases, supporting our observation of non-significant age-sex association.

25.5% representation of patients above 60 years in our cohort similar to the findings of Fritz D et al. study (2020)^[17] reported that elderly patients (above 60 years) accounted for approximately 20-30% of liver lesion cases. They also documented a higher frequency of malignant lesions in older age groups, supporting the trend observed in our study, where malignant neoplasms were predominant among adult and elderly populations.

CONCLUSION

The present study provides a comprehensive overview of the age-wise, sex-wise, and pathological distribution of liver lesions in a tertiary care hospital setting. A wide age range was affected, with a notable burden observed in the paediatric age group (1-10

years) and in older adults, particularly those in the fifth to seventh decades of life, highlighting the bimodal nature of liver lesion presentation. Males constituted a slightly higher proportion of cases compared to females; however, statistical analysis revealed no significant association between age groups and sex distribution, suggesting that liver lesions affect both genders across all age categories in a relatively comparable manner.

Non-neoplastic lesions were marginally more prevalent than neoplastic lesions, emphasizing the continued importance of inflammatory, congenital, metabolic, and chronic liver diseases in the overall disease burden. At the same time, the substantial proportion of neoplastic lesions underscores the growing clinical significance of hepatic tumors in routine pathological practice. Among neoplastic lesions, malignant tumors predominated over benign lesions, reflecting the aggressive nature and late presentation commonly associated with hepatic malignancies in the study population. Although malignant lesions were more frequently observed in males, the difference was not statistically significant, indicating that sex alone may not be a strong independent predictor of tumor behavior.

Overall, the findings highlight the importance of early diagnosis, appropriate screening strategies, and histopathological evaluation in the accurate characterization of liver lesions. The lack of significant gender-based differences across age groups and lesion categories suggests that diagnostic and management protocols should be uniformly applied to all patients irrespective of sex. This study reinforces the crucial role of histopathology as the gold standard in liver lesion diagnosis and provides valuable baseline data that may aid clinicians and pathologists in understanding regional disease patterns, planning targeted interventions, and improving patient outcomes.

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