

Original Article**Histology Changes in the Mucosal Lining of the Gall Bladder Specimens from Patients of Tertiary Care Center****Sarbada Makaju *¹, Suspana Hirachan², Sonam Chaudhary³, Chandra Kala Rai⁴, Munna Alam⁵**

¹ Department of Anatomy, ² Department of Pathology, Kathmandu Medical College and Teaching Hospital, Bhaktapur, Nepal, ³ Department of Clinical Physiology, Mahargunj Medical College, Institute of Medicine, Maharajgunj, Kathmandu, Nepal, ⁴ Department of Physiology, Kathmandu Medical College and Teaching Hospital, Bhaktapur, Nepal, ⁵ Department of Prosthodontics, Nepal Army Institute of Health Science, Kathmandu, Nepal

Article Received: 10th December, 2025; Accepted: 27th March, 2026; Published: 30th June, 2026

DOI: <https://doi.org/10.3126/jonmc.v15i1.96242>

Abstract**Background**

The gallbladder is a hollow, pear-shaped organ situated in the gallbladder fossa on the inferior surface of the liver. It consists of mucosa, muscularis externa and adventitia/serosa. The recognizing histological changes in gallbladder is crucial for early detection of precursor lesions that may progress to cancer.

Materials and Methods

This descriptive study was conducted in the department of Pathology at Kathmandu Medical College and Teaching Hospital from 20 April 2025 to 20 July 2025 after ethical approval from the Institutional Review Committee (Ref no. KMC-IRC 02042025/14). A total of 399 cholecystectomy reports were included after taking the verbal consent. Data were entered in Microsoft Excel and analyzed using SPSS version 25.

Results

The total number of 399 samples were collected. The total participants, 282 (70.7 %) were female and 117 (29.3%) were male. In this study most of the samples were from participants younger than 40 years. In the gross findings the most of the specimens consist of the normal wall but the >40 years had thickened wall 4 (1.7%). In case of the mucosa Ulcerated was second common in both genders. The microscopic findings showed that the epithelium was normal in maximum specimens (262, 65.7%), followed by ulcerated mucosa (94, 23.6%).

Conclusion

The gall bladder specimen showed normal epithelium in most of the cases after cholecystectomy. The abnormal changes include varicosities in smooth muscles, epithelial ulceration and pyloric metaplasia in smooth muscle.

Keywords: *Anatomy, Histology, Tertiary care center*

	©Authors retain copyright and grant the journal right of first publication. Licensed under Creative Commons Attribution License CC - BY 4.0 which permits others to use, distribute and reproduce in any medium, provided the original work is properly cited.	*Corresponding Author: Dr. Sarbada Makaju Associate Professor Email: sarbadamakaju@gmail.com ORCID: https://orcid.org/0000-0002-0981-1438
---	---	--

Citation

Makaju S, Hirachan S, Chaudhary S, Rai CK, Alam M, Histology Changes in the Mucosal Lining of the Gall Bladder Specimens from Patients of Tertiary Care Center, JoNMC. 15:1 (2026) 50-53. DOI: <https://doi.org/10.3126/jonmc.v15i1.96242>.



Introduction

Anatomically, the gallbladder is a hollow, pear-shaped organ situated in the gallbladder fossa on the inferior (visceral) surface of the liver [1]. Histologically, it consists of mucosa, muscularis externa and adventitia or serosa. It doesn't consist of submucosa. It is lined by simple columnar epithelium [2, 3].

The chronic irritation to the wall of gallbladder due to inflammation may lead to structural and cellular alterations. The changes in the epithelium leads to benign, non-neoplastic changes like epithelial hyperplasia, non-neoplastic adaptive changes like metaplasia and pre-malignant changes like dysplasia [4-6]. This epithelium changes becomes key factors in carcinoma of gallbladder. The recognizing these histological changes in gallbladder is crucial for early detection of precursor lesions that may progress to cancer [7].

The objectives of this study are to view the histological changes in the gall bladder specimens which can thereby relate to the incidences and prevalences of carcinomas in Nepalese population.

Materials and Methods

This cross-sectional descriptive study was carried out in the department of Pathology in Kathmandu Medical College and Teaching Hospital, Sinamangal, Kathmandu from 20 April 2025 to 20 July 2025. The study was conducted after getting the ethical clearance from the Institutional review Committee (Ref number: KMC-IRC 02042025/14). The histopathological reports were collected from the Department of Pathology after taking the verbal consent. All the gall bladder specimens received after cholecystectomy of Nepalese population of any age and gender were taken as the samples which were taking within the time periods of three months. The total inclusive sampling technique was used for the duration of prospective 3 months. A total of 399 samples of gallbladder were enrolled within these three months.

The data collected was entered in Microsoft Office Excel worksheet and statistical analysis

was done using Statistical Package for social science (SPSS) version 25 and the non-inferential distributive analysis of these secondary data were done.

Results

A total of 399 samples were enrolled. The gall bladder specimens which were collected was mostly from female participants (282, 70.7%). The participants mostly belong to >40 years age group (241, 60.4%).

Table 1: General Descriptives of the participants having Gall Bladder specimens (n=399)

Variables		Frequency, n(%)
Gender	Male	117 (29.3)
	Female	282 (70.7)
Age	<40 years	158 (39.6)
	>40 years	241 (60.4)

Table 2: Gross Findings of Gall Bladder specimens (n=399)

Site	Findings	<40 years (158)	>40 years (241)	Male (117)	Female (282)	Total (399)
Serosa	Normal	157 (99.4)	241 (100)	117 (100)	281 (99.6)	398 (99.7)
	Congested	-	-	-	-	-
Wall	Normal	156 (98.7)	236 (97.9)	114 (97.4)	278 (98.6)	392 (98.2)
	Thin out	-	-	-	-	-
Mucosa	Thickened	-	4 (1.7)	2 (1.7)	2 (0.7)	4 (1.0)
	Normal	94 (59.5)	147 (61)	71 (60.7)	170 (60.3)	241 (60.4)
	Ulcerated	27 (17.1)	51 (21.2)	23 (19.7)	55 (19.5)	78 (19.5)
	Atrophic	-	2 (0.8)	-	2 (0.7)	2 (0.5)
	Polyp	14 (8.9)	20 (8.3)	16 (13.7)	18 (6.4)	34 (8.5)
Growth		-	-	-	-	-

The gross findings showed that 398 (99.7%) of the sample specimen had normal serosa, with maximum specimen having normal gall bladder wall (392, 98.2%). The mucosa was normal (241, 60.4%) followed by ulcerated mucosa (78, 19.5%).



Table 3: Microscopic Findings of the Gall Bladder specimens (n=399)

Site	Findings	<40 years (158)	>40 years (241)	Male (117)	Fe- male (282)	Total (399)
Epitheli- um	Normal	113 (71.5)	149 (61.8)	80(68.4)	182 (64.5)	262(65.7)
	Ulcerated	33 (20.9)	61 (25.3)	28 (23.9)	66 (23.4)	94 (23.6)
	Mucosa Hyperplasia	1 (0.6)	1 (0.4)	-	2 (0.7)	2 (0.5)
	Hemor- rhages & Congestion	5 (3.2)	19 (7.9)	9 (7.7)	15 (5.3)	24 (6.0)
	Antral metaplasia	-	-	-	-	-
	Intestinal metaplasia	9(5.7)	17 (7.1)	7 (6.0)	19(6.7)	26 (6.5)
Smooth muscle	Hypertrophy & Hyper- plasia	8 (5.1)	16 (6.6)	7 (6.0)	17 (6)	24 (6.0)
	Polyps	14 (8.9)	17 (7.1)	15 (12.8)	16 (5.7)	31 (7.8)
	Dysplasia	-	-	-	-	-
	Malignancy	-	-	-	-	-
	Varicosity	150 (94.9)	221 (91.7)	106 (90.6)	265(94)	371 (93.0)
	Pyloric metaplasia	29 (18.4)	37 (15.4)	14 (12.)	52 (18.4)	66 (16.5)

The microscopic findings showed that the epithelium was normal in maximum specimens (262, 65.7%), followed by ulcerated mucosa (94, 23.6%). The varicosities were present in smooth muscle of maximum specimen (371, 93.0%), followed by the presence of pyloric sphincter metaplasia (66, 16.5%).

Discussion

The gallbladder is a hollow organ; pyriform viscera located on the visceral surface of the liver. It is 7–10 cm long and 2.5–3.5 cm wide which consist of the thin and regular walls. It is located in the gallbladder fossa between the IV and V segments of the liver, an area devoid of the visceral peritoneum [8]. The normal gallbladder wall is composed of three principal layers: mucosa, muscular layer, and serosa/adventitia. Unlike most parts of the gastrointestinal tract, the gallbladder lacks both a muscularis mucosae and a true submucosa, which is an important distinguishing feature in histological evaluation. It doesn't have any goblets cells [6]. The understanding of these normal histological features is essential for identifying pathological alterations such as inflammation, metaplasia, dysplasia, and neoplasia in gallbladder specimens. These histological changes after chronic irritation may lead to severe conditions like carcinogenesis. The Population Based Cancer registry (PBCR,

2019) has reported that the Gall Bladder Carcinoma ranks in fifth position among all site's cancer in Kathmandu Valley with ASR among male and female of 3.7 and 6.7 per 100,000 respectively [9]. Thus, it is important to generate data regarding the histopathological changes' distribution seen in gall bladder specimens in our population. The present study highlights the spectrum of histological changes observed in gallbladder specimens. The gallbladder shows a range of adaptive, inflammatory, metaplastic, and neoplastic alterations depending on the duration and severity of stressors [10].

In this study the relation to gender 282 patients were female (70.7%) and 117 patients were male (29.3%) making the female/male ratio was 7:3. Whereas the study done by Meirelles-Costa et al showed that the number of the specimens collected were the female sample [11]. Among 127 cholecystectomy done, the lesions were predominantly observed in females as compared to males accounting 94 (74.0%) female cases and 33 (26.0%) male cases with male to female ratio (M: F) ratio of 1:2 [12], whereas in this study the sample were more in >40 years. Whereas the study carried on 127 cholecystectomy specimens also showed maximum gall bladder lesions were observed above age 40 [12], whereas in relation to the gross part, thickness of gallbladder was normal in 215 (54.3%) and thickened in 181 patients (45.7%) [4]. The study was done in the children with anomalous pancreaticobiliary ductal union showed the Epithelial Hyperplasia was the most frequent change and was found in 6 (60%) of 10 patients whereas in this study the least Epithelial Hyperplasia was seen [13]. Albores S et al suggest that a small amount of hyperplasia of gall bladder may progress to in situ carcinoma which finally becomes invasive carcinoma [14].

Out of 104 specimens 49% showed the smooth muscle hyperplasia [15], whereas, in 99 cholecystectomy specimens showed 13 (13.2%) ulceration in the specimens [16]. The most polyps in the gallbladder are benign but the smaller proportion may show dysplastic or malignant transformation. In this present study 31 (7.8%) sample had a Polyps in gallbladder. In the gender wise, the prevalence of polyps was more in female than male. Whereas the study conducted by Jorgenson showed the prevalence of polyps were more in male than female [17]. These variations can be attributed to differences in study



population, diagnostic methods, and sample size.

The present study is limited by a relatively small sample size. Only cholecystectomy specimens were included, which may introduce selection of bias. Furthermore, limited tissue sampling may have resulted in under-detection of focal lesions. Also, tracing the risk factors associated with these conditions could have provide with better preventive measures to minimize the risks of stressors for such histopathological changes in the specimens.

Conclusion

The gall bladder specimen showed normal epithelium in most of the cases after cholecystectomy. The abnormal changes include varicosities in smooth muscles, epithelial ulceration and pyloric metaplasia in smooth muscle. The timely identification of cholecystectomy specimens histopathologically is important to detect premalignant or incidental malignant lesions that may not be clinically suspected preoperatively.

Acknowledgement: None

Conflict of interest: None

References

- [1] Jones MW, Kashyap S, Deppen JG. Physiology, gallbladder. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025. PMID: 29494095.
- [2] Gray H, Gallbladder and biliary tree. In: Standring S, editor. Gray's Anatomy: The Anatomical Basis of Clinical Practice. 40th ed. Philadelphia: Churchill Livingstone Elsevier; 2004. p. 1177-81.
- [3] Kuver R, Klinkspoor JH, Osborne WR, et al., Mucous granule exocytosis and CFTR expression in gallbladder epithelium. *Glycobiology*. 10:2 (2000) 149-57. DOI:10.1093/glycob/10.2.149.
- [4] Baidya R, Sigdel B, Baidya NL, Histopathological changes in gallbladder mucosa associated with cholelithiasis, *J Pathol Nepal*. 2:3 (2012) 224-5. DOI:10.3126/jpn.v2i3.6027.
- [5] Bangash M, Alvi AR, Shahzad N, Shariff AH, Gill RC, Factors associated with premalignant epithelial changes in chronic calculous cholecystitis: a case-control study, *World J Surg*. 42:6 (2018) 1701-1705. DOI:10.1007/s00268-017-4371-2.
- [6] Afdhal NH, Smith BF, Cholesterol crystal nucleation: a decade-long search for the missing link in gallbladder pathogenesis, *Hepatology*. 11:4 (1990) 699-702. DOI:10.1002/hep.1840110426.
- [7] Zaki M, Al-Refeidi A, Histological changes in the human gallbladder epithelium associated with gallstones, *Oman Med J*. 24:4 (2009) 269-273. DOI:10.5001/omj.2009.55.
- [8] Van Breda Vriesman AC, Engelbrecht MR, Smithuis RH, et al., Diffuse gallbladder wall thickening: differential diagnosis, *AJR Am J Roentgenol*. 188:2 (2007) 495-501. DOI: 0.2214/AJR.05.1712.
- [9] Dhimal M, Dahal U, Khadka K, Cancer incidence and mortality in selected districts of Nepal in 2019, Kathmandu: Nepal Health Research Council; 2022.
- [10] Choudhary U, Saroj SK, Shekhawat DS, Akhtar MJ, Bhartiya SK, Mishra A, Precancerous gallbladder lesions in cholelithiasis: a histopathological study, *Cureus*.17:12 (2025) e99139. DOI:10.7759/cureus.99139.
- [11] Meirelles-Costa ALA, Bresciani CJ, Perez RO, et al., Are histological alterations observed in the gallbladder precancerous lesions? *Clinics (Sao Paulo)*. 65:2 (2010) 143-150. DOI:10.1590/S1807-59322010000200006.
- [12] Pathak R, Gupta M, Poudel P, Khadka K, Histopathological evaluation of gall bladder in cholecystectomy specimens in a tertiary health care centre of Nepal, *Nepal Med Coll J*. 22:4 (2020) 233-237. DOI:10.3126/nmcj.v22i4.38078.
- [13] Tanno S, Obara T, Fujii T, et al. Epithelial hyperplasia of the gallbladder in children with anomalous pancreaticobiliary ductal union. *Hepatogastroenterology*. 46:30 (1999) 3068-3073. PMID: 10626162.
- [14] Albores-Saavedra J, Molberg K, Henson DE. Unusual malignant epithelial tumors of the gallbladder. *Semin Diagn Pathol*.13:4(1996) 326-338. PMID: 8946610.
- [15] Areeba N, et al., Histological changes of gall bladder mucosa and its correlation with various types of cholelithiasis, *J Res Med Dent Sci*. 9:7 (2021) 211-218. DOI:10.5455/jrmds.2021.97036.
- [16] Sharma T, Vadukoot Lazar M, Kumar Sahu R, et al. Histopathological insights into asymptomatic gallstone disease: justifying prophylactic cholecystectomy in a high-risk North Indian population. *Cureus*.18:1(2026) e101925. DOI:10.7759/cureus.101925.
- [17] Jorgensen T, Jensen KH, Polyps in the gallbladder: a prevalence study, *Scand J Gastroenterol*. 25:3 (1990) 281-286. DOI:10.1080/00365521.1990.12067104.

