

## Original Research Article

# Histopathological analysis of appendix biopsies in patients at a tertiary care centre

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## ABSTRACT

**Background:** One of the most common problems associated with the abdomen is appendicitis. The acute cases of appendicitis are generally treated with appendectomy. The surgical process of removal of appendix, that is, appendectomy, helps in diagnosis of appendicitis. However, the appendix which looks normal macroscopically can actually harbour pathological findings when histopathological assessment is done. Appendiceal tumours or any type of parasitic function can occur in a normal looking appendix.

**Methods:** This is a retrospective, descriptive and a cross-sectional study of all the patients with appendix biopsies seen in Bhaktivedanta Hospital and Research Institute from January 2018 till March 2022. Ethical approval from the Institutional Ethics Committee was obtained for this study. Histopathology reports of appendix biopsies of patients required at Bhaktivedanta Hospital and Research Institute were included in the study.

**Results:** Out of the total 359 cases of appendix biopsies, 209 (58.2%) cases of acute appendix were found to be the most common. Males accounted for 216 (60.17%) cases of appendix biopsies which are in majority in comparison to 143 (39.83%) cases of female appendix biopsies. Based on age grouping, the age group of 11-20 showed majority (25.1%) cases of appendix biopsies.

**Conclusions:** All appendix specimens should be sent for histopathological analysis to document the removal of appendix, to know the pathology diagnosis and to rule out malignancy in the appendix.

**Keywords:** Appendix biopsies, Histopathology, Cancer, Appendicitis

## INTRODUCTION

One of the most common problems associated with the abdomen is appendicitis. The acute cases of appendicitis are generally treated with appendectomy.<sup>1</sup> The surgical process of removal of appendix, that is, appendectomy, helps in diagnosis of appendicitis. In addition to that, excision of the organ helps in lowering the risk of complications like sepsis, perforation and plastron.<sup>2</sup> Laparoscopy is another diagnostic tool used to assess the inside of the abdomen and pelvis. However, the appendix

which looks normal macroscopically can actually harbour pathological findings when histopathological assessment is done. Appendiceal tumours or any type of parasitic function can occur in a normal looking appendix. Hence, surgeons mostly take out the appendix for further analysis.<sup>3</sup> Approximately half of the tumours of the appendix are usually identified intraoperatively.<sup>4</sup> Any case of endometriosis or inflammatory bowel disease can also be analysed from the specimens of the appendix. Some 'normal' looking appendices may present with inflammatory pathological conditions, which can only be

seen at the molecular level.<sup>5</sup> Conducting histopathological analysis of appendix specimens is essential. It helps in diagnosing and confirming cases of acute appendicitis, especially in cases where it is not evident. With the help of histopathological examination, other pathologies which are not observed intraoperatively can become evident and be diagnosed appropriately. Some pathological groups that are usually seen in appendix specimens are cases of infections, granulomatosis, benign and/or premalignant/malignant neoplasms.<sup>6,7</sup> The objective of this study was to conduct histopathological analysis of appendix biopsies at a tertiary care centre.

**METHODS**

This is a retrospective, descriptive and a cross-sectional study of all the patients with appendix biopsies seen in Bhaktivedanta Hospital and Research Institute from January 2018 till March 2022. As the study was retrospective duration-based design, patients for whom the biopsy samples were available in 4 years from 2018-2022 were included in the study. Ethical approval from the Institutional Ethics Committee was obtained for this study. Histopathology reports of appendix biopsies of patients required at Bhaktivedanta Hospital and Research Institute were included in the study. Patients who underwent any other biopsy except appendix biopsy were not included in the study. The specimen when taken from the patient’s body is stored in a container with 10% neutral buffered formalin (NBF). The specimen collected is sent to the pathology lab for histopathological analysis and diagnosis. The container containing the specimen is labelled and sent to the lab. The sample is processed in multiple steps.

Firstly, sample acceptance and numbering are done in the lab after which grossing of the sample is done. Tissue processing and embedding is then carried out after which block cutting of the samples is done. The samples then undergo hematoxylin and eosin staining. The sample will then be mounted, labelled and arranged in trays. The final report is submitted to the pathologist for analysing the samples. The histopathological data will be obtained from the histopathology registers containing the reports from the pathology lab of Bhaktivedanta Hospital and Research Institute. Demographic data will also be obtained from the same. Demography (age, gender), year of biopsy, diagnosis of appendix biopsies is recorded and analysed. Statistical tests will be applied to analyse the histopathological data.

**RESULTS**

Out of the total 359 cases of appendix biopsies, 209 (58.2%) cases of acute appendix were found to be the most common. This was followed by 137 (38.2%) cases of chronic, 12 (3.3%) cases of acute on chronic and 1 (0.3%) cases of cancer. Males accounted for 216 (60.17%) cases of appendix biopsies which are in majority in comparison to 143 (39.83%) cases of female appendix biopsies. The male to female ratio is 1.5:1 (Table 1). Based on age grouping, the age group of 11-20 showed 90 (25.1%) cases of appendix biopsies out of the total 359 cases. The majority of cases of appendix biopsies observed in age group 11-20 (25.1%) were acute (14.48%). In 70 and above age groups, there was no prevalence of appendix biopsies observed. Only 1 (0.28%) case of cancer was observed in the age group 51-60 (Table 2).

**Table 1: Classification of appendix biopsies based on diagnosis.**

Diagnosis	Total (%)	Male	Female	Ratio
Acute	209 (58.2)	132	77	1.7:1
Chronic	137 (38.2)	79	58	1.3:1
Acute on chronic	12 (3.3)	5	7	0.7:1
Cancer	1 (0.3)	0	1	0:1
<b>Total</b>	<b>359</b>	<b>216 (60.17)</b>	<b>143 (39.83)</b>	<b>1.5:1</b>

**Table 2: Classification of appendix biopsies based on age groups.**

Age groups	Total (%)	Acute (%)	Chronic (%)	Acute on chronic (%)	Cancer (%)
≤10	46 (12.8)	30 (8.36)	15 (4.18)	1 (0.28)	0 (0.00)
11-20	90 (25.1)	52 (14.48)	36 (10.03)	2 (0.56)	0 (0.00)
21-30	75 (20.9)	43 (11.98)	30 (8.36)	2 (0.56)	0 (0.00)
31-40	58 (16.2)	33 (9.19)	22 (6.13)	3 (0.84)	0 (0.00)
41-50	48 (13.4)	26 (7.24)	20 (5.57)	2 (0.56)	0 (0.00)
51-60	26 (7.2)	18 (5.01)	7 (1.95)	0 (0.00)	1 (0.28)
61-70	15 (4.2)	6 (1.67)	7 (1.95)	2 (0.56)	0 (0.00)
71-80	1 (0.3)	1 (0.28)	0 (0.00)	0 (0.00)	0 (0.00)
>/=81	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<b>Total</b>	<b>359</b>	<b>209 (58.22)</b>	<b>137 (38.16)</b>	<b>12 (3.34)</b>	<b>1 (0.28)</b>

## DISCUSSION

Appendectomy is one of the most common emergency surgical procedures. To successfully diagnose the lesions of appendix and to understand the pathologies behind the same, histopathological analysis is very useful and important. Even the normal looking appendices are sometimes removed for histopathological examination since there is a possibility of microscopic appendicitis and other abnormal pathologies.<sup>8</sup> In the Western countries, 40% of the emergency surgeries are for acute appendicitis.<sup>9</sup> The percentage is less in the African and Asian subcontinent but based on recent literature, cases of appendicitis have seen an increase because of adoption of Western lifestyle.<sup>10</sup> In this study, 39.83% cases were of females and 60.17% cases were of males with males comprising the majority of the appendix biopsies conducted at this site. The most common age group was 11-20 wherein majority of the appendix biopsies were done. This was followed closely by the age group of 21-30. In other studies, similar results were obtained in which the age group that was the most affected was 11-30 years.<sup>10</sup> In keeping with the published data, the M:F ratio was 1.5:1.<sup>8,10,11</sup> The symptoms of chronic appendicitis are not presented in the similar way as acute appendicitis and diagnosis of the former is done based on appendectomy and histopathological findings.<sup>12</sup> In studies conducted by Punnoose et al, Rehman et al, Elfaedy et al, Dincel et al, and Shreshtha et al, the rate of chronic appendicitis seen was 10.06%, 7.9%, 5.2%, 0.2% and 2.6% respectively.<sup>12-16</sup> This was significantly lower than the rate of chronic appendicitis seen in our study which was 38.2%. In our study, the cases of acute appendicitis were found to be around 58.2% of the total cases on appendix biopsies. This result was similar to the results obtained by Qasmi et al, Ojo et al, and Kumar et al in which 82%, 69.9%, 46.2% cases were of acute appendicitis respectively.<sup>17-19</sup> However, a study conducted by Yilmaz et al only 8.3% of patients who underwent appendix biopsy had acute appendicitis. Only 0.3% of the total appendix biopsy cases turned out to be cancerous. Similar results were obtained from the studies of Jones et al and Ojo et al, wherein the rate of carcinoid tumours seen was 1.05% and 0.95% respectively.<sup>18,20</sup>

The limitation of the study is that, firstly, it is only conducted at one centre. Secondly, since the study is retrospective in nature, the analysis was based on existing patient data.

## CONCLUSION

All appendix specimens should be sent for histopathological analysis to document the removal of appendix, to know the pathology diagnosis and to rule out malignancy in the appendix.

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## REFERENCES

1. Akbulut S, Tas M, Sogutcu N, Arikanoglu Z, Basbug M, Ulku A, et al. Unusual histopathological findings in appendectomy specimens: A retrospective analysis and literature review. *World J Gastroenterol.* 2011;17(15):1961.
2. Unver N, Coban G, Arıcı DS, Buyukpınarbasılı N, Gucin Z, Malya FÜ, et al. Unusual Histopathological Findings in Appendectomy Specimens: A Retrospective Analysis of 2047 Cases. *Int J Surg Pathol.* 2019;27(2):142-6.
3. Hussain A, Mahmood H, Singhal T, Balakrishnan S, El-Hasani S. What is positive appendicitis? A new answer to an old question. Clinical, macroscopical and microscopical findings in 200 consecutive appendectomies. *Singapore Med J.* 2009;50(12):1145-9.
4. Connor SJ, Hanna GB, Frizelle FA. Appendiceal tumors: retrospective clinicopathologic analysis of appendiceal tumors from 7,970 appendectomies. *Dis Colon Rectum.* 1998;41(1):75-80.
5. Polat DA, Münevver M, Selçuk U, Mahir M O, Vasfi M O, Selda S, et al. Unusual findings in appendectomy specimens: Evaluation of 2458 cases and review of the literature. *Indian J Surg.* 2004;66(4):221-6.
6. Charfi S, Sellami A, Affes A, Yaïch K, Mzali R, Boudawara TS. Histopathological findings in appendectomy specimens: a study of 24,697 cases. *Int J Colorectal Dis.* 2014;29(8):1009-12.
7. Swank HA, Eshuis EJ, Ubbink DT, Bemelman WA. Is routine histopathological examination of appendectomy specimens useful? A systematic review of the literature. *Colorectal Dis.* 2011;13(11):1214-21.
8. Marudanayagam R, Williams GT, Rees BI. Review of the pathological results of 2660 appendectomy specimens. *J Gastroenterol.* 2006;41(8):745-9.
9. Edino ST, Mohammed AZ, Ochicha O, Anumah M. Appendicitis in Kano, Nigeria: A 5-year review of pattern, morbidity and mortality. *Ann Afr Med.* 2004;3(1).
10. Oguntola A, Adeoti M, Oyemolade T. Appendicitis: Trends in incidence, age, sex, and seasonal variations in South-Western Nigeria. *Ann Afr Med.* 2010;9(4):213.
11. Ma KW, Chia NH, Yeung HW, Cheung MT. If not appendicitis, then what else can it be? A retrospective review of 1492 appendectomies. *Hong Kong Med J.* 2010;16(1):12-7.

12. Dincel O, Göksu M, Türk BA, Pehlivanoglu B, İşler S. Incidental Findings in Routine Histopathological Examination of Appendectomy Specimens; Retrospective Analysis of 1970 Patients. *Indian J Surg.* 2018;80(1):48-53.
13. Punnoose AP, Joseph E, Joseph D, Thomas BM, Thomas SV, Ivan RA. Histopathological Evaluation of Lesions of Appendix - A Cross Sectional Study. *J Evid Based Med Healthc.* 2021;8(34):3187-92.
14. Rehman S, Khan AI, Ansari HA, Alam F, Vasenwala SM, Alam K, et al. Retrospective analysis of appendectomy specimens: A tertiary care center-based study. *Saudi Surg J.* 2017;5(2):71-5.
15. Elfaedy O, Benkhadoura M, Elshaikhy A, Elgazwi K. Impact of routine histopathological examination of appendectomy specimens on patient management: a study of 4012 appendectomy specimens. *Turkish J Surg.* 2019;35(3):196-201.
16. Shrestha R, Ranabhat S, Tiwari M. Histopathologic analysis of appendectomy specimens. *J Pathol Nepal.* 1970;2(3):215-9.
17. Qasmi SA, Bugti S, Qamar N, Ghani A, Saldera K. Histopathological analysis of biopsy cases processed at diagnostic centers of paf faisal and masroor hospaital. A prospective study. *IntArch BioMed Clin Res.* 2022;8(1):PA1-4.
18. Ojo OS, Udeh SC, Odesanmi WO. Review of the histopathological findings in appendices removed for acute appendicitis in Nigerians. *J Royal Coll Surg Edinburgh.* 1991;36(4):245-8.
19. Kumar A, Altamash S, Kumar A, Singhal P, Bijalwan A. A retrospective study of histopathological exam reports of appendix in appendectomies performed at a teaching hospital in Dehradun. *Int Surg J.* 2020;7(6):1990-3.
20. Jones AE, Phillips AW, Jarvis JR, Sargen K. The value of routine histopathological examination of appendectomy specimens. *BMC Surg.* 2007;7(1).

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