

# Clinicopathological Profile of Anal Fissures in a Tertiary Care Setting: A Retrospective Analysis

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Received: 18 January 2025;

Revised: 27 February 2025;

Accepted: 14 March 2025;

Published: 20 March 2024

## Abstract

**Background:** The epidemiology and contemporary treatment of anal fissures (AF) are underreported in the literature. To address this deficiency, this investigation examined the incidence, comorbidity profiles, and treatment patterns of anal fissures within a hospital-based population. **Methods:** This retrospective analysis examined all adult patients ( $\geq 20$  years) diagnosed with anal fissures (AF) at a tertiary care teaching hospital from 2022 to 2024. Case ascertainment was performed using hospital utilization records, encompassing outpatient visits, inpatient admissions, and surgical interventions. Comorbidity profiles were evaluated by comparing cases to age- and gender-matched controls. **Results:** This retrospective analysis of 350 anal fissure (AF) cases indicated a female predominance (60%, n=210) over males (40%, n=140). The age-specific incidence of AF varied significantly by sex, with peak incidence occurring in females aged 31-50 years and males aged 51-70 years. Furthermore, the study identified statistically significant associations between AF and several comorbidities, including chronic constipation, hypothyroidism, obesity, and solid tumors without metastasis, with elevated prevalence rates observed in the AF cohort. **Conclusions:** Anal fissure is a clinically significant condition with a heterogeneous incidence across age and sex groups. Common comorbid conditions include constipation, obesity, and hypothyroidism. Initial management typically involves topical medications, though prescription adherence is often poor. Surgical interventions, encompassing botulinum toxin injection and lateral internal sphincterotomy, are employed less frequently.

**Keywords:** Anal fissure, Clinicopathological, Retrospective Analysis, Risk factors, Comorbidity, Treatment.

## Background

Anal fissure (AF) is characterized by a linear disruption of the anoderm, extending from the dentate line to the anal verge, with a predilection for the posterior midline <sup>[1,2]</sup>. This anatomical defect elicits significant pain and hematochezia during defecation, frequently accompanied by internal anal sphincter hypertonicity, potentially compromising local blood perfusion and impeding tissue repair <sup>[2]</sup>. While acute AF often resolves spontaneously, persistence of symptoms beyond 4 to 6 weeks is indicative of chronicity <sup>[1,2]</sup>. Though clinically recognized as prevalent anorectal pathology across both adult and pediatric populations by general and colorectal surgeons <sup>[3,4]</sup>, the epidemiological landscape of AF remains poorly defined due to a paucity of comprehensive data <sup>[5]</sup>.

The precise pathogenesis of anal fissures (AF) remains incompletely elucidated. While mechanical trauma from the passage of hard stools or diarrhea is widely implicated as a primary initiating

factor <sup>[1-3]</sup>, clinical observations suggest a more complex etiology. Notably, a review of AF etiology revealed chronic constipation in only 25% of affected individuals <sup>[6]</sup>. Furthermore, a prospective study of 165 women during late pregnancy and the postpartum period demonstrated a significant increase in AF incidence post-delivery (15%), with a substantial proportion occurring beyond the immediate postpartum phase <sup>[7]</sup>. This suggests hormonal or physiological changes associated with pregnancy and delivery may contribute to AF development. Additionally, the presence of multiple fissures or atypical lateral fissure locations should prompt investigation for underlying systemic conditions, including inflammatory bowel disease (Crohn's disease, ulcerative colitis), infectious etiologies (HIV, syphilis, tuberculosis), and neoplastic processes <sup>[8]</sup>.

Lateral internal sphincterotomy (LIS), involving radial anoderm incision and internal sphincter muscle division, remains a primary surgical intervention for anal fissures (AF) <sup>[11]</sup>. While demonstrating superior efficacy (89%) compared to medical

management, surgical approaches are associated with increased cost and a notable risk of persistent anal incontinence [9,10]. For the past three decades, pharmacological interventions, functioning as 'chemical sphincterotomy,' have been explored as alternatives to surgical lateral internal sphincterotomy (LIS) in the management of anal fissures (AF) [1,2,9]. Randomized controlled trials have demonstrated the efficacy of topical agents, including nitroglycerine ointments and calcium channel blockers (diltiazem, nifedipine), in accelerating healing and improving success rates by inducing internal anal sphincter relaxation and enhanced local blood flow [11-18]. Botulinum toxin injections, which directly inhibit anal sphincter hypertonia, have shown marginal superiority over placebo in meta-analyses of randomized trials, albeit with significant variability in reported success [9]. Current clinical guidelines and reviews from international colorectal surgery societies advocate for medical management as a first-line approach for AF, despite recognizing LIS as the gold standard for treatment success [19]. However, the real-world adherence to these guidelines within the general patient population remains undocumented in the medical literature.

This retrospective cohort analysis investigated the epidemiological characteristics, causative risk factors, associated comorbidities, and current treatment modalities for anal fissures (AF) in patients aged six years and older, utilizing hospital records from a tertiary care teaching hospital in Odisha.

## Methods

This retrospective cohort study included patients with a documented diagnosis of anal fissure, identified through healthcare encounters or procedures within the defined study period. To ensure accurate case ascertainment, individuals were included only once for incident anal fissure, with subsequent encounters categorized as either persistence or recurrence of the initial lesion. Patients with follow-up visits for anal fissure extending 12 weeks or more beyond the initial presentation were classified as having chronic or recurrent anal fissure. Eligibility was restricted to individuals aged six years or older at the time of initial diagnosis.

The incidence of AF during the study period was calculated by comparing the number of incident AF cases diagnosed to the total person-years at risk within each age, sex, or ethnicity category. Patients could enroll or disenroll from the health plan in the middle of a calendar year, or otherwise not have a full 12 months of time at risk of developing AF, which creates a risk of bias that might be introduced by variable enrollment periods. Therefore, to reduce this bias, the incidence in person-years was calculated by comparing the number of AF cases occurring during a calendar year by the total person-months of enrollment during that period divided by 12.

Case control matching was used to help identify comorbidities associated with anal fissures. Each anal fissure case was matched to 3 similar patients who did not have anal fissure. The matching criteria included:

- Age at the time of diagnosis / index date [  $\pm$  two years]
- Sex
- Encounter type [ambulatory(clinic)visit, Emergency Department, or inpatient]
- Diagnosis month [+/-6 months]
- Enrolled months after index date [+/-2 months]

## Statistical methods

Categorical variables were analyzed using chi-squared tests, incorporating Yates' correction for continuity where appropriate. Continuous data were assessed for normality; normally distributed means were compared via Student's t-tests, while non-normally distributed continuous variables were analyzed using Wilcoxon rank-sum tests.

## Results

A total of 350 persons met all study inclusion criteria (Table 1). More women (N=210, 60% of cohort) were diagnosed with AF than men.

**Table 1: Demographic characteristics of the anal fissure study cohort.**

Description	Male		Female	
	No	%	No	%
Sex (row %)	140	40.0%	210	60.0%
Mean age(years)*	45.2		39.8	
Age				
>20	10	7.1%	14	6.6%
21-30	6	4.2%	15	7.1%
31-40	11	7.8%	39	18.5%
41-50	19	13.5%	51	24.2%
51-60	28	20%	29	13.8%
61-70	29	20.7%	28	13.3%
70+	37	26.4%	34	16.1%

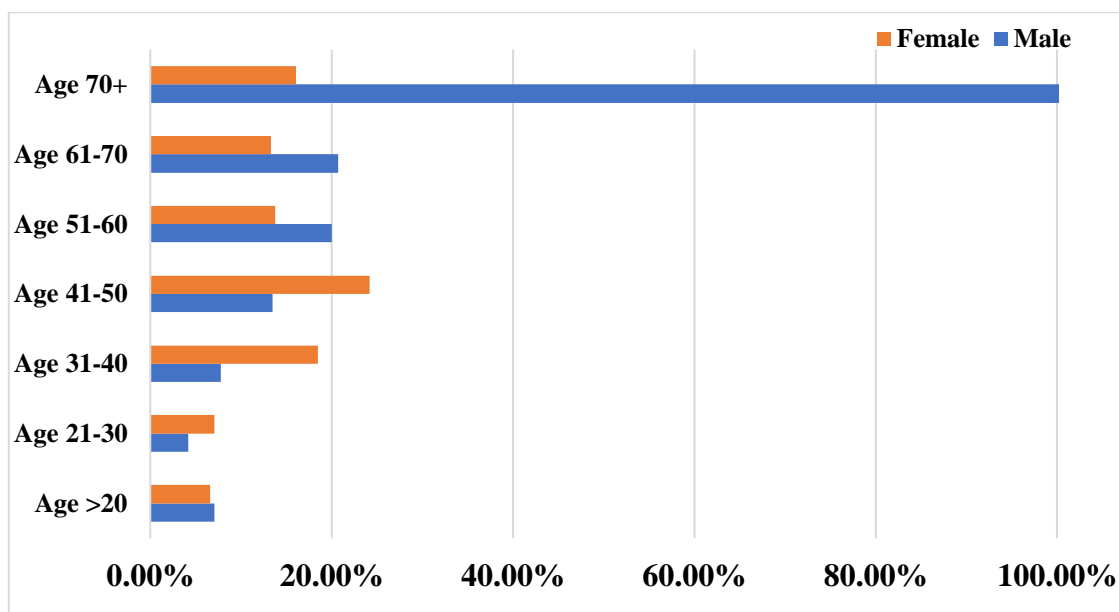


Fig. 1: Demographic characteristics of the anal fissure study cohort

The incidence of anal fissures (AF) demonstrated a bimodal age-sex distribution. Females aged 31-50 years exhibited a significantly higher AF incidence compared to males within the same age bracket. Conversely, males aged 51-70 years presented with a significantly elevated AF incidence relative to females of comparable age. The mean age of AF diagnosis was significantly lower in females (39.8 years) than in males (45.2 years) ( $p < 0.001$ ).

Case-control analysis revealed a statistically significant association between several comorbid conditions and AF (Table 2). Chronic constipation demonstrated the most substantial proportional difference, with a significantly higher prevalence in AF cases (13.33%) compared to controls (3.66%) ( $p < 0.001$ ). Hypothyroidism (13.33% vs. 9.79%,  $p < 0.001$ ) and obesity also exhibited significantly elevated rates among AF cases. Additionally, solid tumors without metastasis and weight loss were identified as

statistically significant comorbidities. Notably, pregnancy displayed a negative association with AF, likely attributable to the preferential use of ICD-9 code 664.6 (anal sphincter tear complicating delivery) over ICD-9 code 565 (anal fissure) in obstetric settings. Conditions contraindicating topical vasodilator use, such as pulmonary vascular disease, were infrequent.

Of the 350 patients diagnosed with AF, the majority (88.8%,  $n=311$ ) received diagnoses during ambulatory visits, with a smaller proportion diagnosed during hospitalizations (1.7%,  $n=6$ ) or procedures (9.4%,  $n=33$ ). Among ambulatory cases, 91 patients were initially diagnosed in the emergency department. A significant proportion of ambulatory AF cases (64.9%,  $n=202$ ) lacked documented follow-up visits. Among those with follow-up, 16.3% ( $n=51$ ) had only one documented follow-up.

Table 2: Comparison of chronic comorbidities among anal fissure cases versus age- and sex-matched controls.

Description	Cases		Controls	
	No	%	No	%
No. of patients* (% of cohort)	105		245	
Comorbidities:				
AIDS	1	0.90%	1	0.40%
Alcohol abuse	2	1.90%	7	2.80%
Chronic blood loss anemia	1	0.90%	2	0.81%
Coagulopathy	2	1.90%	3	1.22%
Congestive heart failure	3	2.80%	7	2.85%
Constipation	14	13.33%	8	3.26%
Deficiency anemias	8	7.61%	17	6.93%
Depression	15	14.28%	29	11.83%
Diabetes (no chr complication)	13	13.10%	30	12.24%
Diabetes (w/chr complications)	3	2.85%	9	3.67%
Drug abuse	2	1.90%	8	3.26%
Fluid and electrolyte disorders	5	4.70%	12	4.89%
Hypertension	33	31.42%	73	29.79%
Hypothyroidism	14	13.33%	24	9.79%
Liver disease	4	3.80%	6	2.44%
Lymphoma	1	0.90%	1	0.40%
Metastatic cancer	1	0.90%	2	0.81%
Obesity	12	11.42%	18	7.34%
Other neurological disorders	5	4.70%	12	4.49%

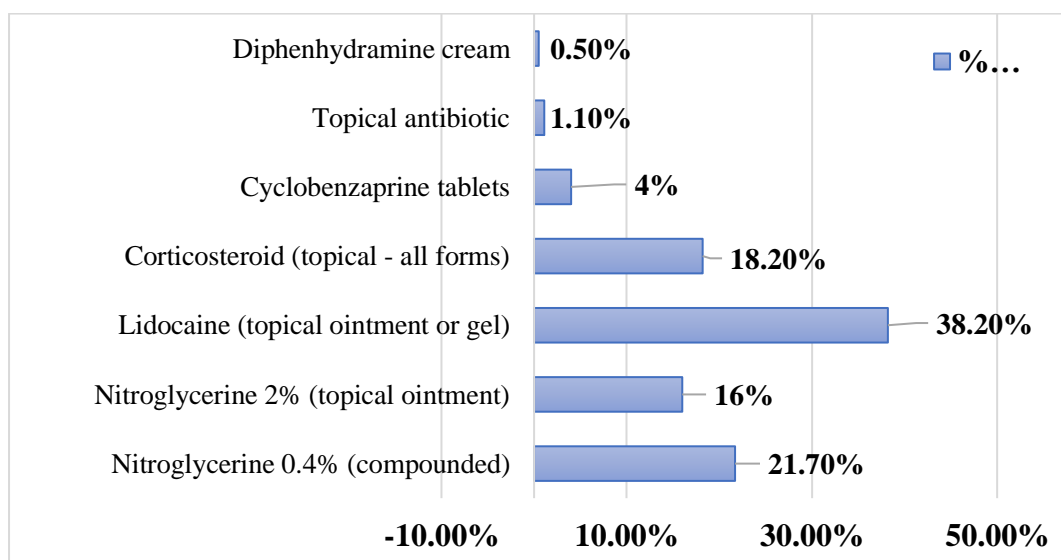
Paralysis	1	0.90%	2	0.81%
Peripheral vascular disease	3	2.85%	8	3.26%
Pregnancy	7	6.66%	21	8.57%
Psychoses	9	8.57%	40	16.32%
Pulmonary circulation disease	2	1.90%	4	1.60%
Renal failure	3	2.85%	6	2.44%
Rheumatoid arth./ col. vasc. dz	4	3.80%	9	3.67%
Solid tumor - no metastasis	6	5.70%	10	4.08%
Valvular disease	2	1.90%	8	3.26%
Weight loss	4	3.80%	4	1.63%
Any Elixhauser diagnosis	70	66.66%	155	63.26%

Post-diagnosis, 6.4% of patients (n=20) required two follow-up visits, while 12.2% (n=38) necessitated three or more. A significant proportion, 14.2% (n=50), exhibited follow-up intervals exceeding 12 weeks, indicative of chronic or recurrent anal fissures (AF). At initial diagnosis, 104 patients received prescriptions for topical corticosteroids, lidocaine gel, 2% nitroglycerin ointment, diltiazem, or combinations thereof. Notably, only two patients underwent procedural interventions (botulinum toxin injection or lateral internal sphincterotomy - LIS) prior to pharmacological therapy. Conversely, the majority of patients receiving botulinum toxin injections (n=30) or LIS (n=5) experienced a delay of at least 12 weeks post-diagnosis before undergoing these procedures. Among those treated with botulinum toxin, 40% (n=12) required subsequent injections. One patient out of 5 that had LIS required a repeat procedure.

Retrospective medical record review of 175 patients diagnosed within the final two years of the study period revealed that 53.7% were initially diagnosed by surgeons, 34.2% by primary care physicians, and 4% by gastroenterologists. Documented treatment recommendations and prescriptions are detailed in Table 3. While 64% (n=112) of patients were recommended prescription medications at initial diagnosis, only 38.2% demonstrated evidence of prescription fulfillment via pharmacy utilization records. Compounded 0.4% nitroglycerin ointment was a common initial treatment (20.8%), but its dispensing could not be verified through the utilization database. Calcium channel blocker ointments were not prescribed at initial visits; however, 2.9% of patients (n=5) received prescriptions for calcium channel blockers (nifedipine or diltiazem) during follow-up visits (Table 3).

**Table 3: Type of medication prescribed at time of initial diagnosis**

Medication	No (%)
Nitroglycerine 0.4% (compounded)	38 (21.7%)
Nitroglycerine 2% (topical ointment)	28 (16 %)
Lidocaine (topical ointment or gel)	67 (38.2%)
Corticosteroid (topical - all forms)	32 (18.2%)
Cyclobenzaprine tablets	7 (4 %)
Topical antibiotic	2 (1.1%)
Diphenhydramine cream	1 (0.5%)



**Fig.2 Type of medication prescribed at time of initial diagnosis**

## Discussion

While clinically recognized as 'common,' precise incidence data for anal fissures (AF) are limited. By extrapolating incidence rates from a large cohort, adjusted for age and sex, an estimated 342,000 new

AF cases occur annually in the US, comparable to the incidence of appendectomies (approximately 280,000 cases). This translates to an overall incidence of 1.1 cases per 1,000 person-years, yielding an estimated lifetime risk of 7.8%.

Analysis revealed subtle sex-based differences in AF incidence. Women showed a slightly higher overall incidence (1.14 per 1,000 person-years) than men (1.04 per 1,000 person-years), though not statistically significant. Age-specific incidence patterns differed: women peaked during adolescence and young adulthood, while men peaked in middle age. Contrary to expectations, pregnancy-related AF was often coded as anal tears, likely due to distinct etiologies and anatomical locations. The study confirmed a strong association between AF and constipation, as well as related comorbidities like hypothyroidism and obesity, potentially explaining age and sex variations in incidence.

Limitations include reliance on ICD-9 coding, potentially introducing misclassification. While chart review indicated high specificity, sensitivity remained unknown. Diagnostic accuracy may vary with clinician expertise, as demonstrated by higher reliability among surgeons compared to primary care providers. Furthermore, the study population's demographics may not be representative of the broader US population, and potential ethnic or racial differences in AF risk cannot be fully excluded. Comorbidity risk estimates may be biased by differential questioning of AF patients and controls. Finally, prescription fill data for compounded medications, often used in AF treatment, were underreported due to cost and availability issues.

## Conclusion

AF is a prevalent condition affecting diverse populations. The observed incidence patterns and associated risk factors warrant further investigation into AF pathogenesis and prevention. Enhanced diagnostic accuracy and improved clinical management, particularly with emerging treatment options, are needed.

## Declarations

## Author Contributions

All authors made substantial contributions to the reported work, including in the areas of conception, study design, execution, data collection, analysis, and interpretation. They participated in drafting, revising, and critically reviewing the article, gave final approval for the version to be published, agreed on the journal for submission, and accepted responsibility for all aspects of the work.

## Conflicts of Interest

The authors declare no competing interests.

## Data Availability

All data generated or analyzed during this study are included in this published article.

## Ethical Approval

The Institutional Ethics Committee has confirmed that no ethical approval was required as it was an observational study.

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