



ARSI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
DEPARTMENT OF GENERAL SURGERY

Fistula Formation and Associated Factors among Adult Patients Underwent Surgery for Perianal Abscess at Asella Teaching and Referral Hospital, Southeast Ethiopia

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ACRONYMS/ABBREVIATIONS

AOR	Adjusted Odds Ratio
ATRH	Asella Teaching and Referral Hospital
ArsU	Arsi University
BMI	Body mass index
COR	Crude odds ratio
CEO	Chief Executive Officer
CI	Confidence Interval
DC	Data collector
DM	Diabetic Mellitus
ED	Emergency department
HIV	Human Immuno-deficiency Virus
HTN	Hypertension
IBD	Inflammatory bowel disease
IQR	Interquartile range
MD	Medical Doctor
MOH	Ministry of Health
MPH	Master of Public Health
MRN	Medical Record Number
OR	Operation Room
PI	Principal Investigator
RVI	Retroviral infection

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Abstract

Background: Fistula-in-ano is a frequent complication after surgical drainage of perianal abscess, occurring in approximately one-third to half of patients. It develops due to ongoing infection and epithelialization of the abscess tract, leading to chronic morbidity and the need for repeated surgical procedures. Identifying factors associated with fistula formation is important for improving treatment outcomes and minimizing complications.

Objectives: To assess rate of Fistula formation and associated factors Among adult Patients Underwent Surgery for Perianal Abscess at Asella Teaching and Referral Hospital, Southeast Ethiopia.

Methods: A retrospective cross-sectional study was conducted for patients admitted and operated with diagnosis perianal abscess at General Surgery ward from February 2020 to February 2025. Data were extracted from medical records using a structured questionnaire, entered into Kobo-Toolbox, and analyzed with SPSS v27. Simple random sampling was used to select charts. Descriptive statistics and bivariable and multivariable logistic regression were used to identify factors associated with treatment outcomes, reported as AORs with 95% CI and $p < 0.05$.

Results: A total of 120 patients with perianal abscess were included in the study, of whom the majority were young adult males and rural residents. Subcutaneous abscess was the most common type, and the overall rate of fistula formation was 33.3%. On multivariable logistic regression, duration of illness greater than 48 hours (AOR = 3.36; 95% CI: 1.20–9.36; $p = 0.021$) and diabetes mellitus (AOR = 16.93; 95% CI: 1.41–203.43; $p = 0.026$) were independently associated with increased risk of fistula formation.

Conclusion: Delayed presentation and diabetes mellitus are independent predictors of fistula formation among patients with perianal abscess. Early intervention and careful management of diabetic patients are essential to reduce the risk of this complication.

Keywords: Perianal abscess, Fistula in ano, Diabetes mellitus, Duration of illness, Ethiopia

1. INTRODUCTION

1.1. Background

Perianal abscess is an acute suppurative infection occurring around the anal canal. Most commonly resulting from obstruction and infection of the anal glands located in the intersphincteric space. Approximately 90% of idiopathic perianal abscesses originate from anal gland infections (1). The infection may spread through the external sphincter to adjacent spaces leading to subcutaneous, intersphincteric, ischiorectal, or horseshoe abscesses (2). Commonly perianal abscess associated with Crohn's disease, malignancy, trauma, tuberculosis, or retroviral infections (3,4).

Clinically patients present with severe anal pain, swelling near the anal verge, erythema, tenderness, and sometimes fever. Subcutaneous abscesses are more visible and easier to diagnose where as deeper abscess such as intersphincteric and ischiorectal types less apparent and require careful evaluation (2,5). Perianal abscess is a common reason for emergency surgical admission required incision and drainage for definitive management (6–8).

Although surgical drainage treats the acute perianal abscess, fistula-in-ano is common and significant complication (9). The pathophysiology involves persistence of the infected anal crypt and epithelialization of the drainage tract resulting in a permanent abnormal connection between the anal canal and perianal skin. Globally following abscess drainage fistula formation occurs in approximately 30–50% of patients (10,11).

A retrospective study conducted in Baghdad Among 68 patients who underwent incision and drainage for perianal abscess about 31 (45.6%) patients develop fistula, with males (30/31) predominating. Fistulas most commonly occurred in the posterior and left lateral positions, and the incidence of fistula formation was notably higher than abscess recurrence (6/68, 8.8%) (12).

Study done at the University of Gondar reported that perianal abscess accounted for 8.3% of anorectal cases and identified diabetes mellitus, retroviral infection (HIV), and previous history of abscess as significant associated factors (13). However despite the burden of disease there is

limited evidence regarding treatment outcomes particularly fistula formation and its associated factors in the Ethiopian context. The absence of local data makes it difficult to guide clinical decision-making and preventive strategies aimed at reducing complications.

1.2. Statement of the problem

Perianal abscess is anorectal surgical emergency requiring prompt incision and drainage (6,7). Although drainage treats the acute infection it does not eliminate the risk of subsequent fistula formation completely. The most common and clinically significant complication is fistula-in-ano which represents the chronic phase of anorectal infection(9).

World wide the rate of fistula formation following perianal abscess varies across different region. A study conducted in Denmark reported that 33.7% of patients developed anal fistula after first-time abscess drainage(14). Similarly a retrospective study in Iraq found a 47.05% rate of fistula after management of perianal abscess(15). In Saudi Arabia and Spain fistula formation rates ranged between 20% and 33%, contributing substantially to morbidity and the need for repeat surgical interventions (16,17). These findings demonstrate that fistula formation is a common and persistent complication worldwide.

Several factors have been associated with increased risk of fistula development. Prolonged duration of symptoms prior to surgical intervention has been shown to significantly increase the likelihood of fistula formation(18). Diabetes mellitus associated with poor healing and higher rates of postoperative fistula(19). Population-based studies further stated the association between perianal fistula and metabolic conditions such as diabetes and obesity(3,20). Other factors such as recurrent abscess, specific abscess types, and smoking have also been implicated in adverse outcomes(14,21). Despite these findings, the relative contribution of these factors varies across populations and healthcare settings.

In Ethiopia prevalence of perianal abscess accounts about 8.3% of cases in Gonder hospitals and diabetes mellitus, retroviral infection, and previous abscess history have been identified as important associated factors(13). However existing local studies primarily focus on prevalence and risk factors for abscess occurrence rather than fistula formation after surgical drainage. There is limited evidence regarding the rate of fistula formation and its associated factors in our set up.

The lack of comprehensive local data on fistula formation following perianal abscess limits clinicians' ability to identify high-risk patients and implement preventive strategies. Without clear understanding of fistula formation and associated factors in the Ethiopian context it difficult to improve quality of care and reduce morbidity related to recurrent disease and repeat surgery.

Therefore, this study aims to assess fistula formation and its associated factors among patients underwent surgery for perianal abscess at Asella Teaching and Referral Hospital there by generating evidence to inform clinical practice and improve patient outcomes.

1.3. Significance of the study

Fistula-in-ano is common and significant complication following surgical drainage of perianal abscess, leading to prolonged morbidity, repeated surgeries, and reduced quality of life. However, there is no local evidence regarding the rate of fistula formation and its associated factors in Ethiopia particularly at Asella Teaching and Referral Hospital.

This study will provide local data on the rate of fistula formation and identify factors associated with its development. The findings will help clinicians identify high-risk patients, improve surgical decision-making and postoperative management, and reduce recurrence and complications. Additionally the study may serve as a reference for future research and support efforts to improve the quality of surgical care in the region.

2. LITERATURE REVIEW

2.1. Magnitude of Fistula Formation Following Perianal Abscess

Perianal abscess and anal fistula represent acute and chronic phases of the same anorectal infection process. Despite adequate incision and drainage certain proportion of patients subsequently develop fistula-in-ano. According to the American Society of Colon and Rectal Surgeons approximately 30–50% of patients who undergo abscess drainage will eventually be diagnosed with anal fistula(10). Similarly literature indicates that fistula formation occurs in about 40% of cases even after proper surgical drainage and may reach up to 66% when abscesses drain spontaneously. The reported population incidence of anal fistula is approximately 8.6 per 100,000 persons per year(9,11).

Several international studies have analysed the magnitude of fistula formation following perianal abscess. A multicentre retrospective cohort study conducted in Denmark between 2018 and 2019 including 475 patients reported that 33.7% developed anal fistula after abscess drainage(14). In Spain a large cohort study conducted from 2014 to 2019 including 27,821 patients with anorectal abscess found that 20% developed anal fistula with higher occurrence among men(17). A retrospective study from Iraq reported a fistula incidence of 47.05% following abscess management(15), while another study from Rashid Hospital reported a risk of 29.2% after first-time drainage(22).

A retrospective crosectional study done in Saudi Arabia the prevalence of fistula formation among patient with perianal abscess was 20.2%(16). Similarly a study from Siriraj Hospital documented that 31% of patients developed fistula-in-ano after incision and drainage(15). Another retrospective study reviewed 109 patients treated for perianal abscess at Salmaniya Medical Complex, Bahrain A fistula developed following abscess drainage in 33.9% of (23). In a cohort of 983 patients, fistula developed in 16.9% of cases and previous history of perianal fistula strongly associated(24).

2.2. Risk Factors for Fistula Formation Following Perianal Abscess

Fistula formation after perianal abscess is influenced by multiple sociodemographic, behavioral, comorbid, and disease-related factors.

2.2.1. Sociodemographic Factors

Being Male has commonly been identified as a significant risk factor for perianal abscess and subsequent fistula formation. A Swedish population-based study conducted between 1997 and 2009 reported a male-to-female ratio of 2.4:1 among admitted patients(3). Similar male predominance was reported in Spain (70% male)(17), Saudi Arabia (80% male)(16), and other studies where more than 75% of patients were men(25,26). Although perianal abscess is more common in young adults aged 20–40 years, fistula formation appears to occur across all age groups. However, elderly patients tend to present with more complex disease patterns(27).

2.2.2 .Behavioral Factors

Smoking has been identified as a strong modifiable risk factor for anal abscess and fistula development. A study published in Diseases of the Colon & Rectum found that recent smoking was significantly associated with anal abscess/fistula (OR 2.15; 95% CI 1.34–3.48; $p = 0.0025$), and the risk remained elevated within five years of smoking(21). Another large Chinese study demonstrated a strong association between smoking and anal abscess/fistula diseases (OR 12.331; 95% CI 8.364–18.179; $p < 0.001$)(28). Alcohol use has been reported among patients with perianal abscess, although its independent role in fistula formation remains less clearly defined(29).

2.2.3.Comorbidities

Diabetes mellitus (DM) is one of common reported risk factors associated with fistula formation. A study showed that diabetic patients had a significantly higher risk of developing fistula compared to non-diabetics (63.6% vs. 18%; $p = 0.001$)(19). A meta-analysis demonstrated a strong bidirectional association between diabetes and perianal abscess, reporting that 30.7% of perianal abscess cases occurred in patients with diabetes(20). Population-based studies from Sweden and Saudi Arabia also identified diabetes as a major associated factor (3,16). Poor glycemic control likely contributes to impaired immune response and delayed wound healing, increasing the risk of chronic fistula tract formation.

Crohn's disease and HIV infection have both been associated with perianal abscess complications; Crohn's disease contributes to recurrence and fistula formation through chronic transmural inflammation of the anorectal region, while HIV-related immunosuppression may predispose patients to persistent infection and subsequent fistula development(13,24).

Obesity has similarly been associated with increased prevalence of perianal abscess and may indirectly increase the risk of fistula formation through chronic inflammatory mechanisms(3,10).

2.2.4. Abscess-Related and Clinical Factors

History of recurrent anal abscess (OR 4.14; 95% CI 2.47–7.01), repeat surgery (OR 5.96; 95% CI 2.33–17.2), intersphincteric abscess (OR 2.77; 95% CI 1.50–5.06), and ischioanal abscess (OR 2.48; 95% CI 1.36–4.47) were identified as significant predictors of fistula development(14). Longer symptom duration greater than two days before drainage was also associated with increased fistula formation(18). Additionally, delayed surgical intervention was linked with higher recurrence and fistula development whereas early drainage reduced the risk(24).

2.2.5. Treatment-Related Factors

Antibiotic use following incision and drainage has been shown to reduce fistula formation in selected patients. A systematic review of six studies including 817 patients demonstrated that

postoperative antibiotics reduced anal fistula formation by 36% (29). Similarly a study from Siriraj Hospital reported fistula rates of 17% among patients who received antibiotics compared to 48% among those who did not with antibiotic administration remaining the only independent protective factor in multivariate analysis(15).

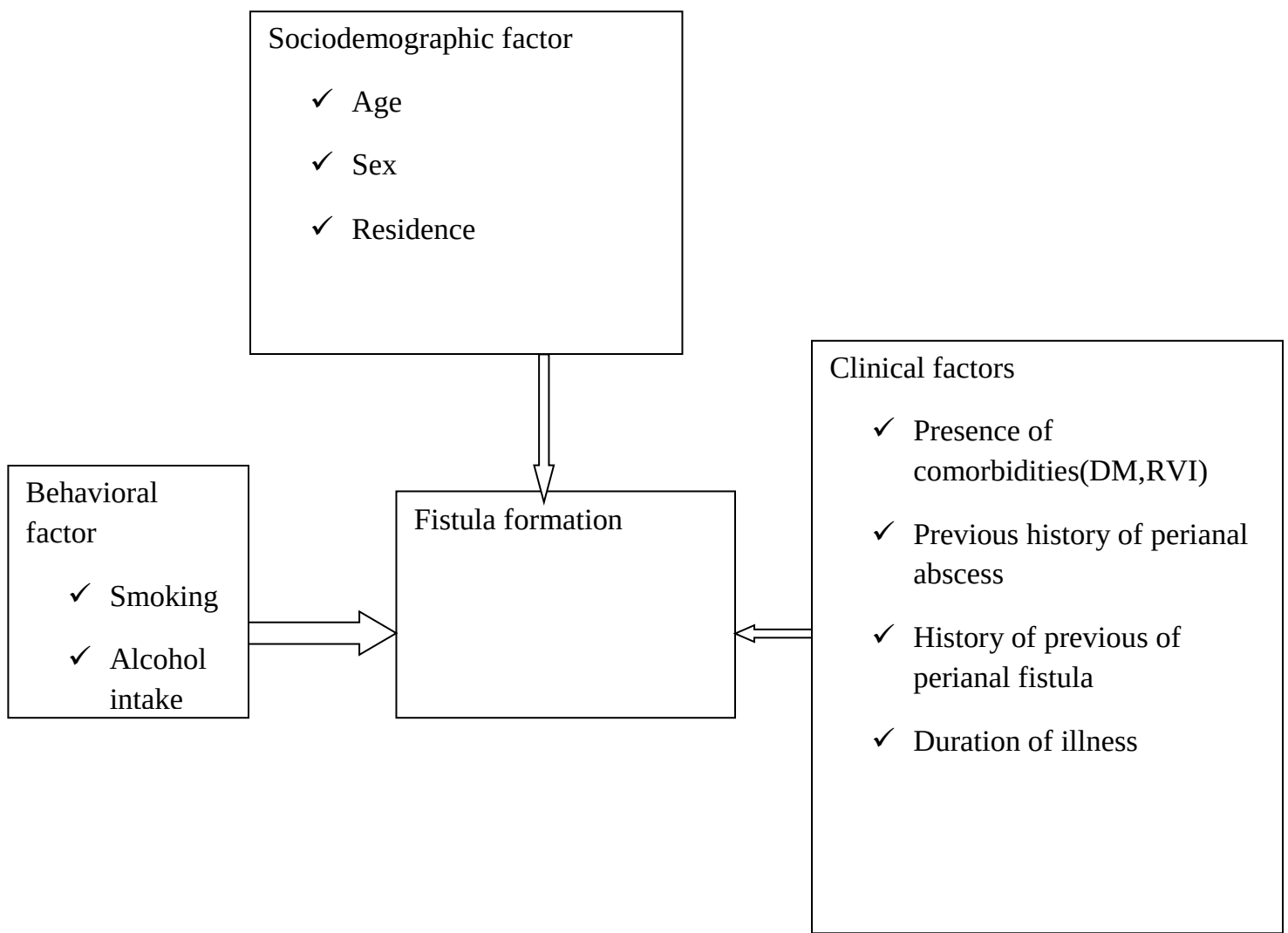


Figure 1: Conceptual framework for the study on fistula formation and associated factor at ATRH from February 2020 to February, 2025 developed by principal investigator after literature review(8,14,16–21,24–27,29).

3. OBJECTIVE

3.1. General objective

To assess rate of fistula formation and its associated factors among adult patients underwent surgery for perianal abscess at Asella Teaching and Referral Hospital, Southeast Ethiopia from February, 2020 to February, 2025.

3.2. Specific objectives

- ✓ To determine rate of fistula formation among adult patients underwent surgery for perianal abscess at Asella Teaching and Referral Hospital from February 2020 to February 2025.
- ✓ To identify factors associated with fistula formation among adult patients underwent surgery for perianal abscess at Asella Teaching and Referral Hospital during the study period February, 2020 to February,2025.

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4. METHODS AND MATERIALS

4.1. Study design and period

An institution-based retrospective cross-sectional study design was conducted on patients admitted with diagnosis of perianal abscess at surgical ward between February,2020 and February,2025.

4.2. Study Area

The study was conducted at Assela Referral and Teaching Hospital, located in Assela town, East Arsi Zone, Oromia, about 175 km southeast of Addis Ababa at an altitude of 2,100–2,700 meters. The hospital, administered by Arsi University, served an estimated catchment population of 3.5 million people. It had five functional operating tables, provided 24-hour emergency surgical services, and conducted elective general surgery three days per week.

4.3. Source and Study Population

4.3.1. Source population

All adult patients who admitted to surgical ward with diagnosis of perianal abscess in Asella Teaching and Referral Hospital Southeast Ethiopia from February, 2020 to February,2025.

4.3.2. Study population

All adult patients admitted and operated with the diagnosis of perianal abscess and meet inclusion criteria in ATRH, from February,2020- February,2025 .

Inclusion criteria: Patients who admitted to surgical ward during study period with complete and accessible medical records.

Exclusion criteria: Patients whose medical cards were not available in the central medical record room or whose medical cards lacked complete information.

4.4. Sample size and sampling procedure

4.4.1. Sample size determination

The sample size for the study is estimated by Epi-Info Version 7.2.7 using a single population proportion formula. The required sample size of the study was determined using a single

population proportion formula by considering the occurrence of fistula in ano from perianal abscess study conducted in Saudi Arabia is 20.2% (16). Confidence level of 95%, margin of error of 5% and 196 source population.

$$N_i = \frac{z^2 pq}{d^2} = \frac{(1.96)^2 (0.202)(1-0.202)}{(0.05)^2} = 247$$

Where:

Source population (N) = 196

Proportion (p) = 20.2% = 0.202

Confidence level = 95% → Z = 1.96

Margin of error (d) = 5% = 0.05

Incomplete / missing charts = 10%

As source population is less than 10,000, we used finite population correction formula.

$$n = \frac{ni}{1 + ni/N} = \frac{(247)}{(1+1.26)} = 247/2.26 = 109$$

Add 10% for incomplete charts final result 120

Finally, a total of 120 study participants were required to conduct the study.

4.4.2. Sampling techniques

Simple random sampling was used to select the medical records. The total source population was 196, and the final sample size was 120. Using a random selection method, 120 charts were chosen from the 196 eligible records. Incomplete charts were replaced by selecting another record randomly until the required sample size was reached.

4.5. Variables of the study

4.5.1. Dependent variable

Fistula formation

4.5.2. Independent variables

- ❖ Socio demographic factors (Age,sex,Residence)
- ❖ Behavioral factor(smoking,alcohol use)
- ❖ Comorbidities (DM,HIV)
- ❖ Duration of illness
- ❖ Previous history of perianal abscess and fistula

4.6. Operational definitions

Perianal abscess: was collection of pus in the tissue around the anus and rectum(30).

Demographic factor: Is statistical characteristic of population such as sex,age and residence.

Diabetes Mellitus (DM): Diagnosed by a healthcare professional, currently on medication for diabetes (oral hypoglycemic agents or insulin), or documented HbA1c $\geq 6.5\%$ or fasting plasma glucose ≥ 126 mg/dL (or random plasma glucose ≥ 200 mg/dL with symptoms).

Incomplete chart: Key questionnaire variables were not available in the medical record charts.

Behavioural factor: Is habit of individual that influence their health and well-being.

Comorbidity: Is simultaneous presence of two or more medical condition.

Fistula formation: The occurrence of an abnormal tract between the anal canal and perianal skin diagnosed after surgical drainage of a perianal abscess during the study period.

4.7. Data collection instrument and procedures

Data were collected using investigator-developed data extraction tools that included sociodemographic characteristics, behavioral factors, comorbidities, clinical features, and fistula formation following perianal abscess surgery. Data extraction was conducted using a

standardized checklist in KoboToolbox by first-year surgical residents and interns under the supervision of a third-year surgical resident.

4.8. Data quality assurance

The principal investigator provided training to data collectors and supervisors on the study objectives, ethical considerations, confidentiality, and proper use of the data collection tools. The investigator and supervisor carefully reviewed all completed questionnaires and performed random checks to ensure accuracy, completeness, and consistency of the data.

4.9. Data processing and analysis

Data were transferred from KoboToolbox to Microsoft Excel and exported to SPSS version 27 for analysis. Data cleaning was performed to check for completeness, missing values, and outliers. Records with missing outcome variables were excluded, and complete case analysis was applied for independent variables. Variables with excessive missing data were excluded from multivariable analysis. After cleaning variables were recoded and categorized as appropriate.

Descriptive statistics were used to summarize the data. Bivariable logistic regression was performed to assess associations between independent variables and fistula formation, and variables with a P-value <0.25 were entered into the multivariable logistic regression model. Multivariable analysis was conducted to control for confounders and identify factors independently associated with fistula formation using adjusted odds ratios (AOR) with 95% confidence intervals. Statistical significance was set at P-value <0.05

4.10. Ethical consideration

Ethical clearance was obtained from the Institutional Ethical Review Committee of Arsi University College of Health Sciences. An official letter of cooperation from the College was submitted to Asella Teaching and Referral Hospital to secure formal permission. The study purpose, procedures, duration, potential risks and benefits, and measures to ensure privacy and confidentiality of the data were clearly explained to the Hospital CEO and Medical Director.

4.11. Results dissemination

The findings of the study will be communicated to academic advisors and Arsi University through oral and written communication. The findings will be communicated too Asella

Teaching and Referral Hospital with their health facilities through seminars and further efforts will be made to publish the findings on national or international peer reviewed journal.

5. RESULTS

5.1. Socio-demographic characteristics of study participants

A total of 120 patients with perianal abscess were included in the final analysis. The majority of patients were adults, with most age falling within the 18–40-year, indicating that the condition predominantly affects the economically productive population. Male patients(80%) were more frequently affected than females. Most of the study participants were from rural areas, as shown in (Table 1).

Table1: Socio-demographic characteristics of 120 patients with perianal abscess treated at ATRH,Ethiopia from February,2020-February,2025 G.C

Variables	Category	Frequency	Percent (%)
Age in years	15-18	3	2.5%
	18-40	97	80.8%
	41-60	15	12.5%
	>60	5	4.2%
Sex of patient	Female	24	20.0%
	Male	96	80.0%
Residence of patient	Rural	74	61.7%
	Urban	46	38.3%

5.2. Clinical symptoms of patients presented with perianal abscess

Perianal pain was the most common presenting symptom among patients with perianal abscess. Perianal swelling was also frequently reported. Other symptoms, including fever and perianal discharge, were observed among a proportion of patients. Additionally, some patients reported constipation and urinary symptoms.

Regarding duration of illness, 45 (37.5%) patients presented within 48 hours of symptom onset, while 75 (62.5%) presented after 48 hours. Details of clinical symptoms and duration of illness are presented in [Table 2](#).

Table2: Clinical symptoms of patients presented with perianal abscess treated at ATRH, Ethiopia from February, 2020–February, 2025 G.C

Variable	Category	Frequency	Percent
Duration of symptom	<48hrs	45	37.5%
	>48hrs	75	62.5%
Perianal swelling	Yes	111	92.5%
	No	9	7.5%
Fever	Yes	30	25.0%
	No	90	75%
Constipation	Yes	46	38.3%
	No	74	61.7%
Perianal pain	Yes	117	97.5%
	No	3	2.5%
Urinary symptoms	Yes	15	12.5%
	No	105	87.5%
Rupture and discharge	Yes	34	28.3%
	No	86	71.7%

5.3. Types of Perianal abscess observed among patients presented with perianal abscess

Among the 120 patients, subcutaneous perianal abscess was the predominant type, observed in 91 (75.8%) patients. Horseshoe abscess and ischioanal abscess accounted for 12 (10%) and 6 (5%) cases, respectively ([Figure 2](#)).

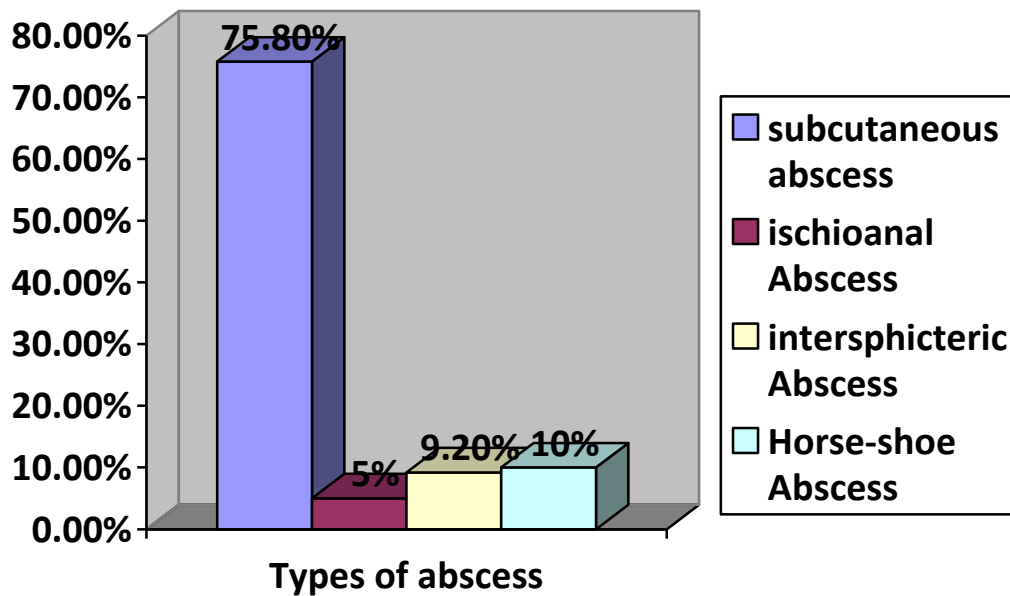


Figure 2:show types of perianal abscess at ATRH, Arsi, Ethiopia from February 2020 to february 2025 (n = 120)

5.4. Treatment given and laboratory parameters

From 120 patients with perianal abscess enrolled in study, the majority received incision and drainage combined with antibiotics (101, 84.2%), while a smaller proportion were managed with incision and drainage alone (19, 15.8%). Regarding laboratory findings, elevated WBC ($>15,000$ cells/mm³) were observed in 82 patients (68.3%), whereas 38 patients (31.7%) had values below 15,000 cells/mm³, as shown in (Table 3).

Table 3: Treatment Given and Laboratory related factors of 120 patient treated at ATRH, Ethiopia from February,2020-february,2025 G.C

Variable		Frequency	Percent
Type of treatment given	Incision & Drainage	19	15.8%

	Incision & Drainage+Antibiotics	101	84.2%
Laboratory parameter(WBC count (cells/mm ³))	<15k	38	31.7%
	>15k	82	68.3%

*WBC = White blood cell count

5.5. fistula formation after perianal abscess treatment

Out of the total 120 patients included in the study, 40 patients (33.3%) developed fistula following treatment of perianal abscess. This finding indicated that nearly one-third of patients experienced progression to fistula, shown with (Fig.3).

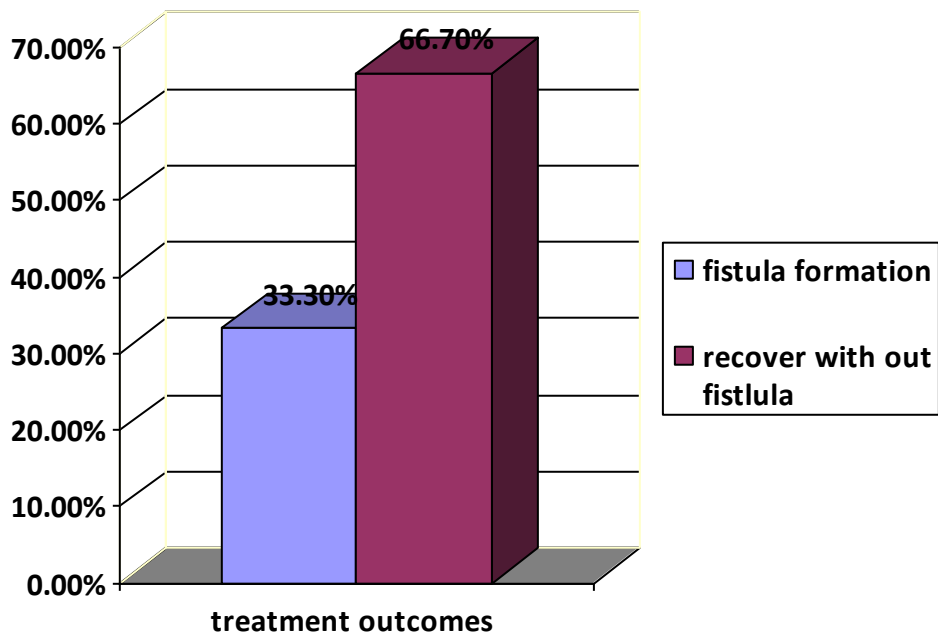


Figure 3:show treatment outcomes of perianal abscess at ATRH, Arsi, Ethiopia from February 2020 to February 2025 (n = 120)

5.6. Factors associated with fistula formation after treatment of perianal abscess

In bivariable logistic regression analysis, variables with a p-value <0.25 were considered for multivariable analysis. These included sociodemographic factors (age, sex, residence), clinical characteristics (duration of illness, type of abscess, laboratory parameters), behavioral factors (smoking, alcohol use), constipation, comorbidities (diabetes mellitus), and clinical history (previous perianal abscess and fistula).

In the multivariable logistic regression model, only duration of illness greater than 48 hours and diabetes mellitus remained statistically significant predictors of fistula formation at $p < 0.05$.

Patients who presented after 48 hours of symptom onset had more than three times higher odds of developing perianal fistula compared with those presenting earlier (AOR = 3.36; 95% CI: 1.20–9.36). Similarly, patients with diabetes mellitus had approximately seventeen times higher odds of developing fistula compared with non-diabetic patients (AOR = 16.93; 95% CI: 1.41–203.43). Other variables were not statistically significant after adjustment (Table 4).

Table 4: Bivariable and Multivariate logistic regression analysis of factor associated with fistula formation after treatment of perianal abscess among 120 patients at ATRH, Ethiopia from February, 2020–February, 2025 G.C

Variable	Category	Fistula formation		COR(95%CI)	P-Value	AOR(95%CI)	P-Value
		Yes	No				
Age	15- 18yrs	1(33.3%)	2(66.7%)	1		1	
	18-40yrs	28(28.87%)	69(71.13%)	0.203(0.018-2.329)	0.200	0.81(0.02-36.48)	0.806
Sex	Female	5(20.83%)	19(79.17%)	1		1	
	Male	35(36.5%)	61(63.5%)	2.180(0.748-6.351)	0.153	2.61(0.63-10.85)	0.187

Residence	Urban	9(19.57%)	37(80.43%)	1		1	
	Rural	31(41.89%)	43(58.11%)	3.034(1.279-7.198)	0.012	1.99(0.66-6.01)	0.218
Duration of illness	<48hrs	12(26.67%)	33(73.33%)	1		1	
	>48hrs	28(37.33%)	47(62.67%)	3.029(1.376-6.667)	0.006	3.36(1.2-9.36)	0.021
DM	No	35(30.7%)	79(69.3%)	1		1	
	Yes	5(83.3%)	1(16.7%)	11.286(1.271-100.2)	0.03	16.93(1.41-203.43)	0.026
Laboratory parameters	<15k	16(42.1%)	22(57.9%)	1		1	
	>15k	24(29.27%)	58(70.73%)	1.758(0.789-3.914)	0.167	1.02(0.31-3.32)	0.977
Smoking	No	32(31.07%)	71(68.93%)	1		1	
	Yes	8(47.06%)	9(52.94%)	2.036(0.718-5.769)	0.181	1.23(0.166-3.496)	0.771
Alcohol use	No	26(29.21%)	63(70.79%)	1		1	
	Yes	14(45.16%)	17(54.84%)	3.596(1.249-10.352)	0.018	1.47(0.30-7.32)	0.635

Constipation	No	20(27.03%)	54(72.97%)	1		1	
	Yes	20(43.5%)	26(56.5%)	2.077(0.955-4.515)	0.065	1.66(0.598-4.591)	0.332
Type of abscess	Subcutaneous	23(25.27%)	68(74.73%)	1		1	
	Ischioanal	3(50%)	3(50%)	2.957(0.557-15.685)	0.203	0.19(0.04-1.05)	0.058
	Intersphincteric	8(67.67%)	3(32.33%)	7.884(1.928-32.248)	0.004	0.40(0.04-4.25)	0.446
	Horseshoe	6(50%)	6(50%)	2.957(0.867-10.078)	0.083	1.32 (0.15-11.84)	0.803
Previous history of abscess	No	27(28.72%)	67(71.28%)	1		1	
	Yes	13(50%)	13(50%)	8.778(0.947-81.344)	0.056	1.72(0.12-24.60)	0.691
Previous history of fistula	No	36(31.3%)	79(68.7%)	1		1	
	Yes	4(80%)	1(20%)	2.481(1.020-6.038)	0.045	1.39(0.37-5.17)	0.627

COR = Crude Odds Ratio; AOR = Adjusted Odds Ratio; CI = Confidence Interval

6. DISCUSSION

This retrospective cross-sectional study assessed fistula formation and associated factors among patients managed for perianal abscess at Asella Teaching and Referral Hospital over a five-year period.

In our study the overall rate of fistula formation after abscess treatment was 33.3%. When compared internationally this figure is comparable to reports from Denmark (33.7%) (14), slightly higher than studies from Spain (20%) and Saudi Arabia (20.2%) (16,17), but lower than findings from Iraq (47.05%) (15). These variations across settings may be explained by differences in study design, surgical techniques, patient characteristics, and access to early care. Differences in diagnostic approaches, including the use of imaging modalities may also influence reported rates. Overall 33.3% of fistula formation observed in this study falls within the internationally reported range of 20–50% (31), supporting the understanding that fistula formation remains a common and clinically significant outcome after perianal abscess drainage.

The socio-demographic pattern observed in this study was consistent with global data. The majority of patients were young adults aged 18–40 years (80.8%), which aligns with findings from the ANZ Journal of Surgery (mean age 42.9 years), a Saudi hospital (mean age 35.9 years), Sweden, Niger (mean age 42 years), and the University of Gondar (21–35 years) (3,16,29,32,33). This suggests that perianal abscess predominantly affects individuals in the economically productive age group. Male predominance was also marked in this study (80%) consistent with reports from Bangladesh (77.33%), the ANZ series (73%), Spain (70%), and Saudi Arabia (80%) (5,16,17,32). The consistent male predominance across different populations may reflect anatomical differences in anal gland distribution, hormonal influences, occupational exposure, or health-seeking behaviors.

Clinically perianal pain (97.5%) and swelling (92.5%) were the most frequent presenting symptoms in our study which is consistent with established literature indicating that pain is nearly universal in perianal abscess and swelling also commonly observed (14). Fever was present in 25% of patients, reflecting that systemic manifestations are not always prominent. About 62.5% of patient presented after 48 hours of symptom onset which may indicate delayed healthcare access, particularly since 61.7% of patients were from rural areas. Delayed presentation has important clinical implications, as prolonged infection may increase tissue

destruction and the risk of fistula formation which was comparable with The European Research Journal (18).

Regarding abscess type subcutaneous abscess was the most common (75.8%), followed by horseshoe and ischioanal types. This finding is partially consistent with the University of Gondar study where subcutaneous abscess was also predominant (50%) (13). However other studies have reported intersphincteric abscess as the most common type (64%) (5). Such variation may be due to diagnostic accuracy. The predominance of superficial abscesses in this setting may indicate that most patients present when the disease is clinically obvious and accessible to simple incision and drainage.

In multivariable analysis delayed presentation (>48 hours) and diabetes mellitus remained statistically significant predictors of fistula formation. Patients presenting after 48 hours had more than three times higher odds of developing fistula (AOR = 3.36; 95% CI: 1.20–9.36). This finding was comparable with a study from The European Research Journal (18). This is explained by ischemia, and progressive tissue destruction resulting in fistula formation. This emphasizes the importance of early diagnosis, prompt referral and timely surgical intervention to reduce complications.

Diabetes mellitus showed a particularly strong association with fistula formation (AOR = 16.93; 95% CI: 1.41–203.43). Although the confidence interval is wide likely due to the small number of diabetic patients the association remained statistically significant. Similar findings have been reported in other studies, where diabetic patients demonstrated a significantly higher proportion of fistula formation compared to non-diabetics (63.6% vs. 18%, $p = 0.001$) (19). The increased risk in diabetic individuals can be explained by delayed wound healing and a high risk of persistent infection.

Other variables such as age, sex, residence, laboratory parameters, smoking, alcohol use, constipation, abscess type, and previous history of fistula and abscess lost statistical significance after adjustment. Although they showed association in bivariable analysis, they did not independently predict fistula formation in the final model. This may be due to confounding effects.

7.STRENGTH AND LIMITATION

7.1.Strengths

A key strength of this study provides comprehensive data on the socio-demographic, clinical factor, management, and fistula formation after treatment of perianal abscess over a five-year period in a ARTH not done previously. Multivariable logistic regression analysis strengthens the validity of the findings. Importantly, the study identifies delayed presentation and DM as an independent predictor of fistula formation.

7.2.Limitation

One of limitation of this study was retrospective design relies on medical record documentation, which may be incomplete or subject to recording bias. The relatively small number of diabetic patients resulted in a wide confidence interval for diabetes mellitus which reduces the precision of the estimation. Being a single-center study the findings may not be fully generalizable to other hospitals or regions with different patient populations and healthcare access.

8. CONCLUSION AND RECOMMENDATION

8.1. Conclusion

In this study of patients with perianal abscess at ATRH, Ethiopia, the majorities were young adult males, predominantly from rural areas, and subcutaneous abscesses were the most common type. The overall rate of fistula formation was about one third, which is comparable to international reports. Multivariable analysis identified diabetes mellitus and duration of illness greater than 48 hours as independent predictors of fistula development, indicating that metabolic comorbidity and delayed presentation significantly increase the risk of this complication. Other sociodemographic, behavioral, and clinical factors were not independently associated with fistula formation

8.2. Recommendations

For Asella Teaching and Referral Hospital:

- ✓ Conduct patient education programs within the hospital to raise awareness on early symptoms of perianal abscess and risk factors.
- ✓ Strengthen record-keeping and data management systems to ensure complete and accurate clinical data for future audits and research.

For Oromia Health Bureau and Arsi Zonal Health Bureau:

- ✓ Promote community-level awareness campaigns in rural areas about perianal abscess symptoms, risk factors, and the importance of timely healthcare-seeking behavior.
- ✓ Strengthen referral systems from primary health centers to ATRH and other surgical facilities to ensure rapid access to definitive care.
- ✓ Support training and capacity-building of health workers in early diagnosis, management, and follow-up of perianal abscess and fistula prevention.

For the Ministry of Health:

- ✓ Develop national guidelines for the management of perianal abscess and fistula, including standardized approaches for high-risk patients such as those with diabetes.
- ✓ Integrate lifestyle risk factor management (smoking, alcohol) into routine surgical care at both regional and national levels.
- ✓ Support national research and surveillance initiatives to track the incidence, treatment outcomes, and complications of perianal abscess to inform evidence-based policy and intervention programs.

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ANNEXES

QUESTIONNAIRE

Department of Surgery

Questionnaire to determine rate of fistula formation and associated factors among patient operated with diagnosis of perianal abscess perianal abscesses among patientat Asella Teaching and Referral Hospital, Southeast Ethiopia, from February, 2020 to february, 2025

1. Sociodemographic data

No	Variable	Category/response
1	Age in years	1. 15- 18yrs 2. 18-40 3. 41-60 4. Greater than 60yrs
2	Sex	1. Male 2. Female
3	Residence	1. Rural 2. Urban

Clinical and laboratory parameters

No	variable	Response
1	pain	1.yes 2.no
2	Swelling and redness	1.yes 2.no
3	fever	1.yes 2.no
4	bowel habit change	1.yes 2.no
5	Urinary symptoms	1.yes 2.no
6	discharge	1.yes 2.no
7	Laboratory parameters	1.<15k 2.>15k

2. Behavioral factors

S no	Variable	Response
1	Smoking	1. Yes 2. No
2	Alcohol intake	1. Yes 2. no

3. comorbidities

S no	Variable	Response
1	Diabetes	1. yes 2. no if yes specify
2	HIV	1. yes 2. no

4. Types of perianal abscess observed among patients presented with perianal abscess

s.no	Type of Abscess
1.	subcutaneous Abscess
2.	Ischioanal Abscess
3.	Intersphincteric Abscess
4.	Horse-shoe Abscess

5.Clinical and disease-related factors

S.no	Variable	Response
1.	. Duration of illness	1.<48 hours 2. >2 days
2.	Previous history of fistula-in-ano	1.yes 2.no
3.	Previous history of perianal abscess	1.yes 2.no

6.Treatment-related factors and treatment outcome

S.no	Variable	Response
1	Type of treatment given	1.Incision &Drainage only 2.Incision & Drainage + Antibiotics
2	postoperative complication	1.Fistula formation a.yes b.no

DECLARATIONS

DECLARATION INVESTIGATOR

I undersigned resident, declare that this thesis is my original work, has never been conducted in the study area, and that all the resources and materials used for the research have been duly acknowledged.

Investigator: _____

Signature _____

Date _____

Date of submission _____

DECLARATION ADVISORS

We, the undersigned advisors, hereby certify that the thesis entitled Fistula Formation and Associated Factors Among Adult Patients Who Underwent Surgery for Perianal Abscess at Asella Teaching and Referral Hospital, Southeast Ethiopia is the original work of the resident and has been prepared in partial fulfillment of the requirements for the award of a Specialty Certificate in General Surgery.

We confirm that the study was conducted under our supervision and guidance, and that it fulfills the academic and scientific standards of the university. We therefore approve the thesis for final submission.

1.Name of primary advisor

Mr. Abdurehman Kalu ((BSc, MPH, Assistant Professor)

Date _____ Signatures _____

2. Name of secondary Advisor

Dr. Tolera Kebede (M.D, Assistant professor of General surgery)

Date _____ Signatures_____

Examiners' Declaration

We, the undersigned examiners, hereby declare that we have thoroughly examined the thesis submitted in partial fulfillment of the requirements for the Specialty Degree in General Surgery. Following careful evaluation and the candidate's successful defense of the thesis, we confirm that it satisfies the academic standards and requirements of the University

We therefore approve the thesis and recommend that the candidate be awarded the Specialty Degree in General Surgery.

Name of Examiner 1: _____

Signature: _____

Date: _____

Name of Examiner 2: _____

Signature: _____

Date: _____

Department Head

Dr. Gemedi Nebi (M.D, General surgeon and HPB surgeon)

Date _____ Signatures _____