

# Outcome and Associated Factors Among Patients Admitted With Perforated Peptic Ulcer in Dessie Referral Hospital: Document Review.

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## Research article

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# Abstract

## Background

Peptic ulcer disease is resulted from imbalances between aggressive factors such as stomach acid, pepsin and mucosa defense barriers. Potentially, associated with life-threatening complications, including bleeding, perforation, penetration, and obstruction. The magnitude and main reasons for this problem is not well known in north east Ethiopia specifically in Dessie referral hospital.

## Objective

To determine outcomes and associated factors among patients admitted with perforated peptic ulcer disease at Dessie Referral Hospital.

## Methods

A retrospective cross sectional study was conducted in Dessie Referral Hospital by revising three years patient card registry data from June 1/ 2016 - May 30/2019 G.C and data were collected using data abstracting checklist. All patients for whom laparotomy were done for perforated peptic ulcer disease during the study period were included. After checking data for completeness entered and cleaned using Epi info version 7 and analyzed using SPSS version 25 and binary logistic regression model were used for testing the presence and strength of association.

## Result

A total of 101 patients were studied. Males outnumbered than females by a ratio of 19.2: 1. The mean age of patients (SD) was 36.05 ( $\pm$ 16.56) years. Most perforations were located on the first part of duodenum 93 (92.1%). Among majority of respondents 98 (97%) had Graham's omental patch of the perforations. There were fifty eight post-operative complications recorded in eighteen (17.8%) patients. Superficial surgical site infection (11.9%), wound dehiscence (6.9%), respiratory infections (14.9%), post-operative collections (7.9%), acute kidney injury (5%) and ECF (1%) complications were identified. Comorbidity [AOR: 9.6(1.451-62.432)], SBP<90mmHg [AOR: 4.82(1.292-17.803)] and age above 50 years [AOR: 6.05(1.612-22.601)] were significantly associated with post-operative complication of perforated peptic ulcer.

## Conclusion and recommendation

Complication and mortality rates in this study were lower than other study findings. Advanced age, co-morbidities, late presentation and hypotension were most important factors affecting patient's out come in perforated peptic ulcer disease. Referral system should be improved to early interventions for better outcome. Post-operative analgesic, chest physiotherapy and appropriate wound care may decrease post-operative complications of perforated peptic ulcer disease.

# Background

Peptic ulcer disease (PUD) represents a worldwide health problem because of its high morbidity, mortality and economic loss (1). It affects 4 million people worldwide annually (2, 3) and its lifetime prevalence in patients with PUD is about 5% (1).

Perforated peptic ulcer (PPU) is a serious complication of PUD and patients with PPU often present with acute abdomen that carries high risk for morbidity with its mortality ranges from 1.3% to 20% (4, 5). Thirty-day and 90-day mortality rate have been reported 20% and 30%, respectively (1).

The pattern of perforated PUD has been reported to vary from one geographical area to another depending on the prevailing socio-demographic and environmental factors. In the developing world, the patients are younger age, male predominance, present later, and there is a strong association with smoking (5). In the west, patients tend to be elderly and there is a high incidence of ulcerogenic drug ingestion (1). Patients with PPU may present with severe, sudden-onset epigastric pain, which can become generalized (6). The peritonitis resulting from acid exposure may present as abdominal 'board-like rigidity'. The clinical picture may be less clear in the obese, the immune-compromised, patients on steroids, patients with a reduced level of consciousness, in the elderly, and in children. In these situations, the clinical history and examination may be non-specific prompting additional imaging and laboratory studies to rule out differential diagnoses. Gas under the diaphragm on plain abdominal erect X-ray is diagnostic in 75% of the cases (5).

The introduction of novel peptic ulcer drugs, such as H<sub>2</sub> receptor blockers and proton pump inhibitors, caused a prompt decline in elective operations for peptic ulcer disease in recent times. On the other hand, surgery for peptic ulcer complications, such as perforations has not changed despite the use of powerful new drugs (1, 4). These shown that simple closure of perforation with omental patch followed by eradication of H. Pylori is a simple and safe option in many centers and have changed the old trend of truncal vagotomy and drainage procedures (1, 5).

Delay in diagnosis and initiation of surgical treatment of perforated PUD has been reported to be associated with high morbidity and mortality after surgery for perforated PUD (7). The associated short-term high mortality reported at 10-30% and morbidity as complications may reached to 50-60% of patients require a careful and structured therapeutic approach to improve outcomes (6).

## Statement of the Problem

Peptic ulcer disease is associated with potentially life-threatening complications, including bleeding, perforation, penetration, and obstruction. Perforation, the second most frequent complication after bleeding (3). Peptic ulcer perforations is a serious complication which affects an average 2-10% of peptic ulcer patients and having an overall mortality ranges from 1.3 and 20% (7). Those life threatening

complication needs special attention with prompt resuscitation and appropriate surgical management (5).

Peptic ulcer disease remains a significant indication for surgery in sub Saharan Africa. Most ulcers were duodenal with remainder gastric (14%). Thirty-five percent of operations were performed for perforation, 7% for bleeding, 30% for obstruction, and 28% for chronic disease. Common operations include vagotomy (60%) and primary repair (31%). The overall case fatality rate for peptic ulcer disease was 5.7% and varied with indication for operation: 13.6% for perforation, 11.5% for bleeding, 0.5% for obstruction, and 0.3% for chronic disease (8).

Adequate study is not done on the pattern of perforated peptic ulcer in Ethiopia. A five year retrospective analysis of 74 operated cases of PPU was undertaken in Black Lion Hospital with 3.4% of the adult emergency surgical procedures. The mean age was 32.6 years; with a male to female ratio of 7.2 to 1.0. In early 22.0% of patients, no previous history of peptic ulcer disease was documented. Delay in diagnosis was noted in 95% of the cases. Most patients had duodenal ulcer perforation, and about 78% had purulent peritonitis at laparotomy 14% fatality in hospital.

A retrospective analysis of medical records of 76 patients who were operated up on for perforated peptic ulcer over a two year period in Zewditu memorial hospital showed male to female ratio was 6.6:1 with a mean age being 31.5 years. The most common presenting symptom was abdominal pain in 76(100%) patients, 25% gave no history of previous peptic ulcer. Among that 53/64(82.8) had smoking and 48/64(75%) chat chewing. Seventy patients (92.1%) presented after 48 hours of their illnesses, 65(85.5%) patients had duodenal ulcer perforation, and mean hospital stay was 14.5 days. Leukocytosis was found in 31.6% of the cases. Postoperative complications occurred in 24(31. %) patients. Twelve (15.8%) patients died in hospital (9).

In a study done at Ayder Comprehensive Specialized Hospital from 2015 -2016, 514 emergency surgical operations of which 439 were laparotomies for none-traumatic acute abdomen and 20(4.1%) were done for perforated PUD (10).

However, health planners and health professionals needs to design primary prevention strategy to reducing the rate of PUD and modification of secondary prevention strategy for improving patient's outcome. As far as my knowledge is concerned the magnitude and its factors those contributed to the outcome of perforated peptic ulcer disease in DRH not well known. Therefore, the purpose of this study is to determine the outcome and identify associated factors among patients to whom emergency laparotomy done for perforated peptic ulcer disease in Dessie referral hospital, north east Ethiopia.

## Methodology

### Study area and period

Retrospective cross sectional study conducted in DRH from september1 – 10/2019 G.C by reviewing three years' secondary data of patient card registry. Dessie is located in South Wollo Zone, 401 km North East from Addis Ababa, capital city of Ethiopia and 480 km from Bahir dar, capital city of Amhara regional state. DRH serve for more than 8 million populations from Afar, Amhara and Tigri regions. The hospital is administered by Amhara Regional Health office and is the largest and oldest hospital among all in the region providing teaching for medical students and Residents every year in collaboration with Wollo University. DRH is the only public hospital in the city in addition to four private hospitals and six higher clinics. The hospital has 494 beds for adult in patient and of which 80 for surgical ward. Intensive care unit has 4 beds, and around 650 staffs working in the hospital. There are 15 general surgeons, 5 general practitioners, 1 neurosurgeon, 20 nurses, 40 surgical residents and 10 interns who are practicing in surgical ward, Regular outpatient department, Emergency outpatient department and Surgical Referral Clinic. The operation rooms are 4 and 4866 major operations done each year on average. There is one minor operation room with 2 beds inside. All adult patients operated for perforated peptic ulcer disease and all adult patients operated for perforated PUD at Dessie referral hospital from June 1/2016-May 30/2019 G.C were source and study populations respectively. Patients operated for perforated PUD in the specified period with complete documentation included and perforations caused by other than PUD (tumor, trauma), patients with incomplete documentation as well as patient age <15 years (considering age <15 as pediatrics) were excluded in the study.

## Sample size and sampling procedure

Because of other studies in Ethiopia at different health facilities proportion/prevalence were small, Ayder referral hospital 4%, therefore we take all charts(101) those for perforated peptic ulcer disease at Dessie Referral hospital to improve small sample size comparing to the previous studies. Sampling procedure in this study take all charts from the card room after communication with record office leader and staffs. Cards and logbooks use to complete patients information from June 1/2016 G.C-May 30/2019 G.C.

## Measurements

**Early admission:** patients admitted and operated within 24 hours for perforated peptic ulcer

**Late admission:** patients operated for perforated peptic ulcer after 24 hours

**Duration of symptoms:** the time span between the initial pain perception due to perforation and visit to hospital.

**Favorable outcome:** after operation patients those who improved and discharged without any complication

**Unfavorable outcome:** patients after operation who are either died or develop at least one complication

# Data collection tools and technique

Patients were identified from operation room logbook by using their final status of operation outcome and pick their Medical Record Number (MRN) for each. Then collect their charts from record office by using their own MRN numbers and information gathered using pre-prepared checklist from the information recorded on the card. To ensure the quality of data first the checklist was designed carefully by taking sample patient charts with cross checking the logbook, guideline as well as from different literatures and junior surgery resident data collectors were trained for one day on the objective of the study, ethical manner during chart reviewing and how to fill every checklist properly. The collected data were also continuously reviewed for accuracy and completeness by the principal investigator with timely correction every day and charts those incomplete were excluded from the study.

## Data processing and analysis

After checking data for completeness they were entered, coded, cleaned with Epi info version 7 and exported to SPSS statistical software version 25. Continuous variables were shown as mean  $\pm$  SD or median. Results of this study were presented by using proportions, tables, and graphs for description of study populations. Determining the best predictor(s) which effect on both morbidity and mortality was evaluated by multiple logistic regression analysis after adjustment for all possible confounding factors. Any variable with univariable analysis whose P value of  $<0.25$  was accepted as a candidate for multivariable logistic regression analysis. Consider a variable whose P value less than 0.05 was statistically significant. Odds ratio (ORs) with 95% confidence intervals (CIs) used to check both the presence and strength of associations. Hosmer and Lemeshow goodness-of-fit test was performed for the final multivariable regression model.

## Results

### Socio demographic characteristics

One hundred twelve patients underwent emergency laparotomy for perforated peptic ulcers. Of these, 11 patients, response rate was 90%, were excluded from the study due to failure to meet the inclusion criteria. Among 101 patients 96(95%) men and 5(5%) women were enrolled in the study. There was a male preponderance with a ratio of 19.2 to 1. Majority of patients 67 (66.3%) were younger than 50 years with mean age of  $36.05 \pm 16.56$ , Figure 1.

Figure 1 age distribution of PPU operated patients at Dessie referral hospital from June 1/2016- may30/2019 G.C.

### Factors to develop peptic ulcer

Sixty two (61.4%) and 38(37.6%) patients reported previous history of dyspepsia and treatment for peptic ulcer disease, respectively. Nine (8.9%) patients reported history of recent ingestion of alcohol whereas only 3 patients have history of NSAIDS. Seven (6.9%) patients had co-morbidities with hypertension, diabetes mellitus, RVI, cardiac disease, respiratory illnesses, Table 1.

Table 1 risk factors and co morbidities of PPU operated patients at Dessie referral hospital from June 1/2016- May 30/2019 G.C

### **Clinical presentation at admission**

Duration of illnesses ranged from 1 to 10 days with mean duration of  $2.5 \pm 1.77$ days. Fifty six (55.4%) patients presented before 48 hours of onset of symptom, 45 (44.6%) of patients presented after 48 hours of onset of symptoms. All 101 patients presented with sudden onset of severe abdominal pain, Table 2.

Table 2 clinical features of PPU operated patients at Dessie referral hospital from June 1/2016- May 30/2019 G.C.

### **Intra operative finding during admission**

Most perforations were located on the 1<sup>st</sup> part of duodenum 93 (92.1%), whereas in 8(7.9%) patients had their ulcers located on the antral part of stomach. The duodenal to gastric ulcers ratio was 11.6: 1. Seventy four (73.3%) of the perforations were minimal size ( $\leq 5$  mm), the rest 27(26.7%) greater than 0.5cm. The amount of peritoneal fluid 38 (37.6%) of patients were  $<0.5$  liter. Majority of patients 98 (97%) had Graham's omental patch of the perforations with a pedicle omental patch. Another three patients had simple direct closure. Sub hepatic drain was left in only one patient.

### **Post-operative complication**

Fifty eight post-operative complications were recorded in eighteen patients (17.8%). The mean age of patients who developed complications was 37.3. Respiratory infection (25.8%) was the most common post-operative complication. A patient with diabetes developed SSI, ARF, respiratory infection, and post opileus. One patient with HTN developed SSI, intra-abdominal abscess, respiratory infection and post opileus. Another patient with cardiac illness developed respiratory infection, ARF, intra-abdominal abscess, sepsis, wound dehiscence and SSI. Fifty five (55.4%) patients were presented before 48 hours of their illness, Table 3.

Table 3 post-operative complications of PPU operated patients at Dessie referral hospital from June 1/2016- May 30/2019 G.C.

### **Factors associated with complications of PPU**

The presence of comorbidity, hypo-tension with SBP $<90$ mmHg, age less than 50 years and length of pre-operative stay were significantly associated with post-operative morbidity during Univariate analysis.

Variables were significantly associated with development of complications among perforated peptic ulcer patients age greater than 50 yrs, patients presented with shock and co-morbid ones. The odds of patients having age less than 50 years were 6.05 times develop complication than those than above this year [AOR:6.05 (1.612-22.601)], perforated peptic ulcer patients who presented with shock 4.82 times more complicated than the others [AOR:4.82 (1.292-17.803)] and on the other way co-morbid illness were 9.6 times contributing for development of complications [AOR:9.6 (1.451-62.432)]. (Table 4).

Table 4 factors associated with complications of PPU operated patients at Dessie referral hospital from June 1/2016- may30/2019 G.C.

## Discussion

One hundred twelve patients were operated within three years period in Dessie referral hospital. On average thirty four cases presented annually with slightly higher incidence than in Irrua Nigeria and Tanzania (7, 12). These differences based on variations in risk factors for perforated peptic ulcer disease. All patients admitted with complain of sudden onset of abdominal pain as well as nausea (75%), vomiting (78%), and abdominal tenderness (97%). This finding is consistent with a study done at Zewditu hospital (9). Study done in Tanzania (7) was also comparable with abdominal pain (97%), vomiting (37%), and tenderness (88%).

In this study duodenal ulcer perforation was the most common type of perforation with a duodenal to gastric ulcer ratio of 11.5:1. This is comparable to a study in Zewditu memorial and Tanzanian hospitals, the reported ratio were 8.5:1, 12.7:1 (7, 9) respectively. In other way a study done Irrua Nigeria reported high incidence of gastric ulcer perforations than duodenal ulcer perforation with 2:1(12).

Pedicle omental patch was the most common choice of operation through the three years period (97%). It is easier, fast and end with acceptable complications. Similar surgical treatment pattern were reported in Tanzania and Jaipur India (7, 18).

Overall, eighteen (17.8%) patients were developed postoperative complications in this study with 95% CI (10.5, 25.2). It is in line with studies done in Turk in different sites 20.3% and 23% respectively (3, 5) but lower than studies done in Tanzania(29%) and Zewuditu memorial hospital (31%) (7,9). Respiratory infection (25.8%), surgical site infection (20.7%), wound dehiscence (12.06%) and abscess formation (13.8%) were the commonest complications, which is consistency with a study done in New Delhi, India, were reported that superficial surgical site infection (28%), pneumonia (30%), and wound dehiscence (20%) (18).

Post operated perforated peptic ulcer (PPU) complication occurred commonly in younger age group in the current study which is six times more likely to developed complications than those whose age group greater than fifty years. Median age in this case 28 years which is comparable with studies done in Côte d'Ivoire, Minilik Hospital and Tanzania with median age of 34, 33.5 ,32.4 years respectively (7,11,17). This may be attributed to demographic profile of high H. pylori infection, smoking, drinking alcohol in younger

age groups than adults to increase risk of PPU and it is comparable with study done in Black lion and Nigeria Hospitals (2, 12)

Mortality rate after surgical management of perforated peptic ulcer were 4% with 95% CI (1.00, 7.90). It is in agreement with studies done in India (5.2%), Turkish (5.8%) but lower than studies done in Tanzania (10.7%), Irrua, Nigeria (17.3%) (3, 7, 12, 18). Mortality was high in patients with age  $\geq$  50 years and concomitant diseases, which is similar with a study done in Tanzania (7).

Delayed presentation after 48 hours increase both post-operative complication and mortality which is comparable with a study done in Tanzania (7). Patients may take medications in the pre-hospital period to hope those symptoms to be abate. It is also possible that some clinicians managing patients initially may not have considered perforation as a possible diagnosis.

Post operated perforated peptic ulcer (PPU) complication occurred commonly in younger age group in the current study which is six times more likely to developed complications than those whose age group greater than fifty years. Median age in this case 28 years which is comparable with studies done in Côte d'Ivoire, Minilik Hospital and Tanzania with median age of 34, 33.5 ,32.4 years respectively (7,11,17). This may be attributed to demographic profile of high H.pylori infection, smoking, drinking alcohol in younger age groups than adults to increase risk of PPU and it is comparable with study done in Black lion and Nigeria Hospitals (2, 12)

Co-morbid illnesses have ten times more significantly associated with outcome of perforated peptic ulcer disease. Seven percent of patients in the current study were presented with comorbid illnesses. It is similar with a study done in Tanzania (7%) but much lower than that of Côte d'Ivoire 73%, (7, 11). These differences may be due to health care system accessibility of services especially media, health care facilities and health care providers to prevent, treat and giving care early.

Lower blood pressure was another risk factor on the development of complications due to post-operative perforated peptic ulcer disease. Patients who have low systolic blood pressure were five times more likely to develop complications in this study.

Average preoperative hospital stay also has a contribution for the occurrence of complication after surgical management among perforated peptic ulcer disease patients. It is two times more likely to develop complication in this study. The average hospital stay of the patients was 6 days which has slight improvement as compared with perforated peptic ulcer disease at Zewditu memorial hospital 14.5 days (9), reason could be low co-morbidity illnesses in this study. Small sample size and as usual being retrospective study are limitation of this study.

## **Conclusion And Recommendation**

Both morbidity and mortality were lower as compared with majority of the studies. Surgical site infection, wound dehiscence, ARF, and respiratory infection were common post-operative complications in the

current study. Old age, co-morbidity and shock at presentation were strongly associated with post-operative perforated peptic ulcer complication.

## **Recommendation**

Increasing patient awareness on importance of early presentation to the health facility is paramount important in reducing post-operative complications. Referral system should be improved so as to early intervention will be done. Post-operative analgesic, chest physiotherapy and early management of co-morbid health problems may decrease post-operative complications.

## **Abbreviations**

APACHE: Acute physiologic and chronic health evaluation, BLH: Black lion hospital, CT: Computed tomography, DRH: Dessie referral hospital, DU: Duodenal ulcer, ECF: Enterocutaneous fistula, GU: Gastric ulcer, Ax: History, ICU: Intensive care unit, NSAIDs: Nonsteroidal anti-inflammatory drugs, PUD: Perforated peptic ulcer disease, SSI: Surgical Site Infection, ZES: Zollinger Ellison syndrome.

## **Declarations**

### **Ethics approval and consent to participate**

Formal letter was obtained from Wollo University Institutional Review committee (IRC) permission and written consent was taken from college management and oral consent was taken from record office department to collect patient cards. Any information gained from patient's card upon data collection was kept confidentially by using codes for each card throughout the study. There was no individual participation in person because only document review.

### **Consent for publication**

All authors have agreed to submit this paper in its current form for consideration for publication in world journal of emergency surgery. There are no individual details, images and videos of study participants.

### **Availability of data and materials**

The datasets used during analysis of the study are available from the corresponding author (Tesfaye Birhane; [tesbir21@gmail.com](mailto:tesbir21@gmail.com)) for reasonable requests.

### **Competing interest**

The authors declared that no any competing interest.

### **Funding**

It is not applicable

### **Authors' contribution**

**Wondwossen Amtataw:** proposal writing, participated in data collection, analyzed the data, report writing and finalizes the paper.

**Tesfaye Birhane Tegegne:** approved the proposal with few revisions, participated in data analysis, revised subsequent drafts of the paper and prepare manuscript.

**Teka Yimer:** approved the proposal with revisions, participated in data analysis, revised final paper.

**Wolde Melese:** Edit and revise manuscript

All authors read and approved this manuscript.

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## Tables

**Table 1 risk factors and co morbidities of PPU operated patients at Dessie referral hospital from June 1/2016- May 30/2019 G.C**

<b>Variables</b>		<b>Frequency</b>	<b>Percent</b>
Co morbid Illness	Yes	7	6.9
	No	94	93.1
Smoking History	yes	6	5.9
	No	95	94.1
History of chewing chat	yes	18	17.8
	no	83	82.2
History of alcohol ingestion	yes	9	8.9
	no	92	91.1
History of NSAIDS use	yes	3	3
	no	98	97
History of dyspepsia	yes	62	61.4
	no	39	38.6
History of dyspepsia treatment(62)	yes	38	37.6
	no	24	23.8

**Table 2 clinical features of PPU operated patients at Dessie referral hospital from June 1/2016- May 30/2019 G.C.**

Clinical features		Frequency	Percentage
Nausea	Yes	76	75.2
	No	25	24.8
Vomiting	Yes	79`	78.2
	No	22	21.8
Abdominal tenderness	Yes	98	97
	No	3	3
Duration of illness	<48hrs	56	55.4
	>48hrs	45	44.6
BP at presentation	<90	29	30
	>90	72	70
PR at presentation	>100	64	60
	<100	37	40
WBC at presentation	>11000	54	53
	<11000	37	37

**Table 3 post-operative complications of PPU operated patients at Dessie referral hospital from June 1/2016- May 30/2019 G.C**

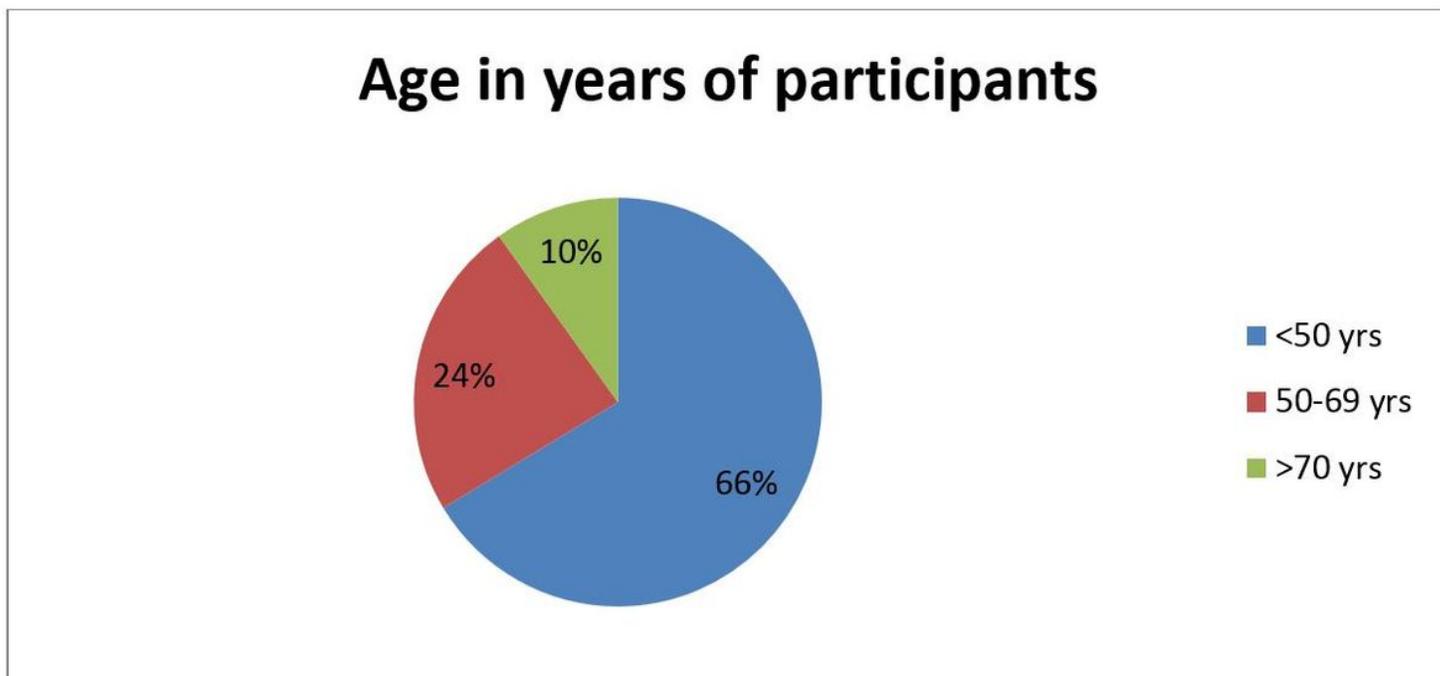
Variables	Frequency(n=58)		Percentage
SSI	Yes	12	20.7
	NO	46	79.3
Wound dehiscence	Yes	7	12.1
	No	51	87.9
Sepsis	Yes	7	12.1
	No	51	87.9
ECF	Yes	1	1.7
	No	57	98.3
Intra-abdominal abscess	Yes	8	13.8
	No	50	86.2
ARF	Yes	5	8.6
	No	53	91.4
Respiratory infection	Yes	15	25.8
	No	43	74.2
Generalized peritonitis	Yes	3	5.2
	No	55	94.8
Post opileus	Yes	9	15.5
	No	49	84.5

**Table 4 factors associated with complications of PPU operated patients at Dessie referral hospital from June 1/2016- may30/2019 G.C**

Variable		complications		COR,95%CI	AOR,95%CI
		Yes	No		
Age	≤50	9	72	6.54(2.134-20.077)	<b>6.05(1.612-22.601)</b>
	>50	9	11	1	<b>1</b>
Co morbid illness	Yes	5	2	15.58(2.731-88.858)	<b>9.6(1.451-62.432)</b>
	No	13	81	1	<b>1</b>
length of pre-op stay	<48hrs	5	51	1	<b>1</b>
	>48hrs	13	32	4.14(1.349-12.727)	1.99(0.521-7.622)
Systolic BP	<90mmhg	10	18	5.67(1.923-16.742)	<b>4.82(1.292-17.803)</b>
	>90mmhg	8	65	1	<b>1</b>

Note: To determine the association for multivariable logistic regression analysis P-value is <0.05.

## Figures



**Figure 1**

Age distribution of PPU operated patients at Dessie referral hospital from June 1/2016- may30/2019 G.C.