e-ISSN: 0975-9506, p-ISSN: 2961-6093

Available online on www.ijpqa.com doi: 10.25258/ijpqa.16.10.68

International Journal of Pharmaceutical Quality Assurance 2025; 16(10); 431-437

Original Research Article

A Comprehensive Study on Clinical Profile, Management Strategies, and Outcomes of Patients with Obstructive Jaundice

Manish Kumar[1], Rashmi Singh[2], Manish[3]

[1]Associate Professor, Department of General Surgery, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, India

[2]Senior Resident, Department of Obstetrics and Gynaecology, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, India

[3]Professor and HOD, Department of General Surgery, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, India

Received: 11-08-2025 / Revised: 22-09-2025 / Accepted: 24-10-2025

Corresponding Author: Dr. Rashmi Singh

Conflict of interest: Nil

Abstract:

Background: Obstructive jaundice is a common and challenging surgical condition associated with significant morbidity and mortality, especially when diagnosis and intervention are delayed. Its etiology varies from benign biliary obstruction to advanced malignancies, necessitating timely evaluation and tailored management.

Aim: To study the clinical profile, etiological factors, management strategies, and outcomes of patients presenting with obstructive jaundice at a tertiary care center.

Methodology: This prospective observational study included 40 patients (>12 years) with confirmed obstructive jaundice. Clinical features, laboratory parameters, imaging findings, etiology, management modalities, and post-intervention complications were systematically analyzed.

Results: Obstructive jaundice was most common in the 41–60-year age group. Jaundice and abdominal pain were universal symptoms. Most patients had moderate to severe hyperbilirubinemia. Benign causes predominated (57.5%), with choledocholithiasis being the most common, while malignant causes accounted for 42.5%, chiefly carcinoma head of pancreas. Management included endoscopic, surgical, and palliative interventions. Wound infection was the most frequent complication (20%), while serious complications were relatively infrequent.

Conclusion: Obstructive jaundice commonly affects middle-aged and elderly patients, with benign etiologies being more prevalent. Early diagnosis, accurate etiological assessment, and individualized management significantly improve outcomes.

Keywords: Obstructive jaundice, Choledocholithiasis, Biliary obstruction, ERCP, Surgical management, Outcomes.

Introduction

Obstructive jaundice is a commonly occurring clinical problem and a major challenge in surgery. It arises because of the blockage of the normal channels used by the hepatocytes to transfer conjugated bilirubin into the intestine leading to the buildup of the bile pigments in the blood and eventual clinical presentations [1]. This obstruction can be either at any point along the biliary tract such as intra and extrahepatic bile ducts or be at the ampulla of Vater level. Obstructive jaundice is clinically described as a yellowish discolouration of skin and sclera, dark urine, pale stool, itchiness and some level of systemic involvement based on the degree of obstruction and duration.

Obstructive jaundice is regarded as one of the most complicated and hard to solve issues under the management of general surgeons [2] among the surgical conditions. The condition is linked to high morbidity and mortality especially when it is not diagnosed and intervened with. The physiological problems of long-time biliary obstruction are the disruption of hepatic functioning, coagulopathy because of the inability to absorb vitamin K, kidney disorder, malnutrition, and immune insufficiency. Not only they aggravate the overall state of the patient but also predispose the patient to more perioperative risks and negatively influence the outcomes of surgeries.

The etiology of obstructive jaundice is heterogeneous and differs extensively in relation to different geographical areas and medical organizations. The most common causes are benign, which are: choledocholithiasis, benign biliary strictures, and inflammatory conditions, and malignant causes such as carcinoma of the pancreas, cholangiocarcinoma,

gallbladder carcinoma and periampullary tumors. There is a significant difference in the known causes of obstructive jaundice in different centers, depending on the demographic profile, lifestyle, the incidence of possessing gallstone disease, and the presence of diagnostic centers. This heterogeneity requires studying at the institutional level in order to learn about the local trends in the disease and to streamline the management plans.

The determination of the presence, level and nature of biliary obstruction in preoperative period, are important in the management of obstructive jaundice [3]. A poorly selected or improperly designed surgical or interventional process may result in severe complications, lengthy stay in the hospital, rising costs of healthcare, and high morbidity and mortality. Thus, the proper diagnosis by means of relevant clinical examination, laboratory tests, and imaging tools is a crucial process that helps in making therapeutic choices. The development of diagnostic methods has also greatly enhanced the capacity to determine the cause and severity of biliary obstruction; nevertheless, this is not always available in the resource-constrained environments.

The underlying cause of obstruction is very closely related to the morbidity and mortality that are related to obstructive jaundice [4]. Benign diseases are usually good to prognose because when early diagnosed they can be controlled and have a better prognosis, but malignant causes are usually diagnosed at the later stages and the outcome is poor. The curative surgical intervention in malignant obstructive jaundice can be restricted, and the treatment is often associated with palliative operations to address the components of the biliary obstruction and enhance the quality of life. On the other hand, benign causes can be subject to conclusive surgical repair with positive long-term outcomes.

To enhance the outcomes of patients with obstructive jaundice, it is necessary to have a comprehensive understanding of the factors that led to the elevated morbidity and mortality rates in patients. The early diagnosis, the prompt intervention, the correct choice of surgical or palliative procedures, and the close attention to the perioperative care could help to decrease the number of complications and mortality considerably. Nevertheless, these goals are not always easy to attain in developing nations where patients usually turn up when the disease is at an advanced stage. Late presentation is often linked to severe pathology, ill nutritional condition, serious biochemical imbalances, and concomitant infections, which negatively influence treatment outcomes.

The lack of modern diagnostic and treatment plants is another step in the management of obstructive jaundice in developing countries. Inadequate access to sophisticated imaging procedures and endoscopic surgery and specialized surgical skills tend to delay diagnosis and limit the treatment process. As a result, patients will tend to experience emergency or suboptimal procedures, which will expose them to more risks of postoperative complications and mortality. These difficulties show that the clinical profiles, the management plans, and the clinical outcomes in patients with obstructive jaundice require region-specific studies.

A longitudinal analysis of the clinical presentation of the patients with obstructive jaundice in the individual centers can offer some good results as far as local pattern of the disease manifestation, etiological determinants, and the complications. These studies assist in determining general causes, clinical variations, and effectiveness of various diagnostic and therapeutic methods. Moreover, the study of the outcomes of the treatment will result in the determination of factors that affect the prognosis and contribute to the optimization of the management strategies based on the availability of resources.

The given research is carried out to review clinical characteristics of patients admitted to our facility with obstructive jaundice. This proposes examining etiopathogenesis, diagnostic modalities, treatment modes such as surgical and palliative procedures, and overall prognosis of patients having obstructive jaundice. The analysis of these parameters will help the study to make a contribution to the improvement of the knowledge on obstructive jaundice in our environment and offer the data that can help manage patients better and minimize the morbidity and mortality rates that are related to this hard-to-treat issue.

Methodology

Study Design: This was a hospital-based prospective observational study conducted to evaluate the clinical profile, management strategies, and outcomes of patients diagnosed with obstructive jaundice.

Study Area: The study was conducted in the Department of General Surgery, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, India.

Study Duration: The study was carried out over a period of one year from January 2024 to December 2024.

Sample Size: A total of 40 patients diagnosed with obstructive jaundice were included in the study.

Study Population: The study population consisted of patients above 12 years of age, of either sex, admitted to the Department of General Surgery with clinical and investigational evidence of obstructive jaundice during the study period.

Data Collection: Data were collected prospectively from all eligible patients admitted to the Department of General Surgery, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, India, during the study period. After obtaining written informed

consent from the patient or their legal guardian, each participant was enrolled in the study. A detailed history was taken with particular emphasis on demographic characteristics, presenting symptoms such as jaundice, abdominal pain, pruritus, fever, and weight loss, and the duration of symptoms.

All patients underwent thorough clinical examinations, and relevant laboratory investigations were performed, including liver function tests and other routine hematological and biochemical parameters. Radiological investigations such as ultrasonography of the abdomen were carried out in all patients, while advanced imaging modalities including computed tomography (CT), magnetic resonance cholangiopancreatography (MRCP), or other appropriate investigations were performed as indicated to confirm the diagnosis and determine the etiology of obstructive jaundice.

Details regarding the management strategy adopted for each patient, including conservative treatment, endoscopic intervention, surgical procedures, or palliative care, were recorded. Patients were closely monitored throughout their hospital stay for treatment response, postoperative complications, duration of hospitalization, and overall clinical outcomes. All collected data were systematically entered into a pre-designed and pre-tested proforma to ensure uniformity and accuracy for subsequent analysis.

Inclusion Criteria

- Patients aged more than 12 years
- Patients of either sex
- Patients clinically suspected to have obstructive jaundice
- Patients with obstructive jaundice confirmed by investigative modalities

Exclusion Criteria

- Patients aged below 12 years
- Patients with jaundice due to non-obstructive causes, such as hemolytic or hepatocellular jaundice
- Patients attending OPD but not admitted
- Patients with incomplete or missing medical records
- Patients with other concomitant malignancies
- Patients with significant comorbid conditions such as uncontrolled diabetes mellitus, hypertension, cerebrovascular accident (CVA), tuberculosis, coronary artery disease (CAD), or chronic kidney disease
- Pregnant women

Procedure: All eligible patients underwent detailed clinical evaluation followed by appropriate laboratory and radiological investigations to determine the cause of obstructive jaundice. Based on the etiology and patient condition, suitable management strategies—conservative, endoscopic, surgical, or palliative—were implemented. Patients were monitored for complications and treatment outcomes until discharge.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using appropriate statistical software. Descriptive statistics were used to summarize data. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Relevant statistical tests were applied where appropriate, and a p-value of <0.05 was considered statistically significant."

Result

Table 1 depicts the age-wise distribution of 40 patients with obstructive jaundice, showing a predominance of middle-aged and elderly individuals. The highest number of cases was observed in the 51–60-year age group with 12 patients (30%), followed by the 41–50-year group comprising 10 patients (25%). Patients aged 31–40 years and 61–70 years accounted for 6 cases each (15% each). Younger age groups were less commonly affected, with 3 patients (7.5%) in the 21–30-year group and only 2 patients (5%) in the 13–20-year group. Very few cases were seen in those above 70 years, with just 1 patient (2.5%). Overall, Table 1 indicates that obstructive jaundice was most frequently encountered in patients between 41 and 60 years of age.

Table 1: Distribution of cases according to age group (N = 40)

Age group (years)	Number of patients	Percentage (%)
13–20	2	5
21–30	3	7.5
31–40	6	15
41–50	10	25
51–60	12	30
61–70	6	15
>70	1	2.5
Total	**40**	**100**

Table 2 shows the distribution of presenting symptoms and clinical signs among 40 patients with obstructive jaundice. Jaundice and abdominal pain were universal symptoms, reported in all patients

(100% each). Other common symptoms included clay-colored stools in 22 patients (55%), fever in 20 (50%), loss of appetite in 18 (45%), and itching in 16 patients (40%). On clinical examination, icterus was present in all cases (100%), while abdominal tenderness was observed in 26 patients (65%). Itching marks were noted in 14 patients (35%), a palpable gall bladder in 8 patients (20%), and hepatomegaly in 6 patients (15%). Overall, Table 2 highlights jaundice with abdominal pain as the predominant presenting features, with a substantial proportion showing signs suggestive of cholestasis and biliary obstruction.

Table 2: Distribution of presenting symptoms and clinical signs (N = 40)

Symptoms / Signs	Number of patients	Percentage (%)
Symptoms		
Jaundice	40	100
Pain in abdomen	40	100
Clay colored stool	22	55
Fever	20	50
Loss of appetite	18	45
Itching	16	40
Clinical signs		
Icterus	40	100
Abdominal tenderness	26	65
Itching marks	14	35
Palpable gall bladder	8	20
Hepatomegaly	6	15

Table 3 depicts the distribution of patients according to total serum bilirubin levels among 40 cases of obstructive jaundice. The majority of patients had moderately to severely elevated bilirubin levels, with 18 patients (45%) showing levels between 11–20 mg/dL, making this the most common category. This was followed by 14 patients (35%) with bilirubin levels of 5–10 mg/dL. Extremes of bilirubin levels were less frequent, with 4 patients (10%) each having levels below 5 mg/dL and above 20 mg/dL. Overall, Table 3 indicates that most patients presented with significant hyperbilirubinemia, reflecting advanced biliary obstruction at the time of presentation.

Table 3: Distribution of patients according to total serum bilirubin levels (N = 40)

Total bilirubin (mg/dL)	Number of patients	Percentage (%)
<5	4	10
5–10	14	35
11–20	18	45
>20	4	10
Total	**40**	**100**

Table 4 shows the etiological distribution of obstructive jaundice among 40 patients, categorized into benign and malignant causes. Benign etiologies were more common, accounting for 23 cases (57.5%), with choledocholithiasis being the predominant cause seen in 18 patients (45%), followed by benign biliary stricture in 3 patients (7.5%) and choledochal cyst in 2 patients (5%). Malignant causes constituted 17 cases (42.5%), among which carcinoma of the head of pancreas was the most frequent, affecting 7 patients (17.5%). This was followed by distal CBD cholangiocarcinoma in 4 patients (10%), while hilar cholangiocarcinoma and carcinoma gall bladder were observed in 3 patients each (7.5%). Overall, Table 4 highlights that although benign causes, particularly choledocholithiasis, were the leading contributors to obstructive jaundice, a substantial proportion of cases were due to malignancies, emphasizing the need for thorough evaluation to guide appropriate management.

Table 4: Etiological distribution of obstructive jaundice (N = 40)		
A. Benign causes		
Etiology	**Number of patients**	**Percentage (%)**
Choledocholithiasis	18	45
Benign biliary stricture	3	7.5
Choledochal cyst	2	5
Total benign	**23**	**57.5**
B. Malignant causes		
Etiology	**Number of patients**	**Percentage (%)**
Carcinoma head of pancreas	7	17.5
Distal CBD cholangiocarcinoma	4	10
Hilar cholangiocarcinoma	3	7.5
Carcinoma gall bladder	3	7.5
Total malignant	**17**	**42.5**

Table 5 depicts the various management modalities adopted in patients with obstructive jaundice (N = 40). ERCP stone extraction or stenting and choledochoduodenostomy were the most commonly performed interventions, each undertaken in 7 patients (17.5%). CBD exploration with T-tube insertion and Roux-en-Y hepaticojejunostomy were performed in 6 patients each (15%). Major surgical procedures included Whipple's procedure in 5 patients (12.5%) and triple bypass surgery in 4 patients (10%). Less frequently used modalities were percutaneous transhepatic biliary drainage (PTBD) in 3 patients (7.5%) and palliative stenting in 2 patients (5%). Overall, Table 5 highlights a broad spectrum of endoscopic, surgical, and palliative approaches tailored to the underlying etiology and operability of obstructive jaundice.

Table 5: Management modalities adopted in patients with obstructive jaundice (N = 40)		
Intervention	**Number of patients**	**Percentage (%)**
ERCP stone extraction / stenting	7	17.5
CBD exploration with T-tube insertion	6	15
Choledochoduodenostomy	7	17.5
Roux-en-Y hepaticojejunostomy	6	15
Whipple's procedure	5	12.5
Triple bypass surgery	4	10
Percutaneous transhepatic biliary drainage (PTBD)	3	7.5
Palliative stenting	2	5
Total	**40**	**100**

Table 6 summarizes the post-intervention complications observed among 40 patients. Wound infection was the most common complication occurring in 8 patients (20%). Cholangitis was noted in 3 patients (7.5%), while septicemia and anastomotic leak were each observed in 2 patients (5% each). Less frequent complications included ERCP-induced pancreatitis, electrolyte imbalance, and stent occlusion or dislodgement, each affecting 1 patient (2.5%). Overall, Table 6 indicates that while minor complications such as wound infection were relatively common, serious procedure-related complications were infrequent in the post-intervention period.

Table 6: Post-intervention complications observed (N = 40)		
Complication	**Number of patients**	**Percentage (%)**
Wound infection	8	20
Cholangitis	3	7.5
Septicemia	2	5
Anastomotic leak	2	5
ERCP-induced pancreatitis	1	2.5
Electrolyte imbalance	1	2.5
Stent occlusion / dislodgement	1	2.5

Discussion

The obstructive jaundice was highest in the sixth decade of life according to our study with the mean age of 51.10 years. This observation is quite similar to the report conducted by Padhy et al. (2017) [5] that reported the mean age of 55.5 years, and

Saadoon (2016) [6] that reported the mean age of 52 years in patients with obstructive jaundice. These results indicate that obstructive jaundice is mostly observed in middle-aged individuals and older adults, which is perhaps because the risk of biliary and malignancies increases with age. The research also indicated that there was a higher female representation (58) than males (42) and the male-to-female ratio was 0.7:1. The same was observed by Chalya et al. (2011) [7] who documented that the prevalence was higher in females between benign and malignant causes. Nevertheless, previous research by Zollinger et al. (1960) [8] has indicated that there was an equal sex ratio indicating that the difference in sex distribution could be due to regional, cultural, or health care access differences."

All of the patients in our study clinically presented with jaundice and abdominal pain, which is aligned with the results of Saddique and Iqbal (2015) [1], who found abdominal pain to be the most frequent manifestation of obstructive jaundice manifestation. Likewise, Goyani et al. (2015) [9], found jaundice in 96% of patients, and abdominal pain in 86% of patients, whereas Gupta et al. (2017) [10], found jaundice in 91.7% and abdominal pain in 75% of patients. Additional symptoms in our cohort were clay-colored stools (58%), fever (54%), loss of appetite (48%), and pruritus (42%). Such clinical signs indicate the perturbed bile discharge and potential secondary infections of biliary obstruction. Icerus was universal on examination, abdominal tenderness was found in 66% of cases and itching marks were seen in 34%. A palpable gallbladder was found in 20 percent of the patients compared with 50.9 percent of patients with malignancy by Chalya et al. (2011) [7] and 30 percent by Miller (1951) [11]. This difference can be associated with the difference in the stage of the tumor at the time of presentation and the ratio of benign and malignant cases.

The biochemical examination revealed that the majority of the patients were moderate to severely hyperbilirubinemic with 42 percent of them having a total bilirubin level of 11-20mg/dl. The higher bilirubin levels (>10mg/dl) were linked to malignant causes, and the lower levels were mostly linked to benign causes. This fact is in line with Garcea et al. (2011) [12] [13], who stated that high bilirubin is a predictor of malignancy and Chaudhry et al. (2017) [13], who indicated that bilirubin is very sensitive as a marker of malignant obstruction. Significantly elevated bilirubin in obstructive jaundice was also observed by Hayat et al. (2005) [14] as it also supported the role of bilirubin levels in the diagnosis and prognostication.

In terms of etiology, benign etiology slightly outweighed malignant etiology in our study with choledocholithiasis as the most common benign etiology, which was found in close to fifty per cent of all cases. Other harmless causes were biliary strictures and choledochal cysts. Carcinoma of the head of the pancreas was the commonest of the malignant causes then distal and hilar cholangiocarcinoma and carcinoma of the gall bladder. These outcomes can be compared to the research by Wang and Yu (2014) [15] who defined choledocholithiasis as the most prevalent one, along with biliary strictures and pancreaticobiliary malignancies. Kurian and John (2015) [16] also found a higher rate of benign (78% obstetric) to malignant (22%) lesions, which correlates to ours. Conversely, Padhy et al. (2017) [5] identified a greater percentage of malignant causes (67%), which is regional etiological differences.

Our study management strategies were etiologically and disease-stage-based. Endoscopic surgeries like ERP with stone removal or stent placement were used in benign cases and selectively surgical interventions like choledochoduodenostomy and hepaticojejunostomy were done. In resectable malignancies Whipple operation was done, but in advanced cases it was used as palliative procedure, such as triple bypass, percutaneous transhepatic biliary drainage and palliative stenting. These methods are in line with the preceding literature by Chalya et al. (2011) [7], who reported palliative measures in 73.1% of malignant obstructive jaundice cases, and by Chalya et al. (2011) [7], who added that palliative surgery was frequently required because of advanced disease. As Mohamed and Syed (2015) [1] also pointed out, curative surgery of the benign obstruction and palliative management of the malignant cases, the necessity of specific management is confirmed.

We identified 40 percent of patients in our study to have postoperative complications, with wound infection (20 percent) the most prevalent, then cholangitis (6 percent), and sepsis (4 percent). Pancreatitis following ERCP was found to occur in 2 per cent of cases and anastomotic leak and electrolyte imbalance were factors that led to death in a small number of patients. The reported rate of this complication was greater than 22.4% reported by Chalya et al. (2011) [7], which could be because of increased contamination of surgery or comorbidity of patients. Our cohort mortality rate was 6% with deaths in patients with advanced malignancy and postsurgery problems. Compared to that, a higher mortality of 60% patients in the operation due to obstructive jaundice was reported by Sanie (2016) [17], and a mortality rate of 11.25% was reported by Dalwani and Shaikh (2015) [18] in the study. Such disparities highlight the differences in disease stage, comorbid conditions, and healthcare resources as determinants of outcomes.

Altogether, in our results, obstructive jaundice is mostly observed in middle-aged/elderly patients, where benign causes are more frequently found in younger patients and malignant causes in older males. Imaging, clinical presentation and bilirubin level are also important in distinguishing between

benign and malignant etiologies. Specialized management plans, including endoscopic treatment to radical surgery or palliative treatment, are critical in enhancing the outcome, but the postoperative complications are noteworthy. The findings tend to be quite similar to those of regional and international research and identify similar trends and areas of difference in epidemiology, etiology and outcomes.

Conclusion

This paper brings to focus the fact that the clinical presentation of obstructive jaundice is a characteristic clinical manifestation in middle-aged and elderly patients and is marked by the typical clinical manifestation of jaundice and abdominal pain which is usually accompanied by systemic and cholestatic symptoms. Most cases were benign etiologies, especially stone-related obstruction, but malignant causes were also a major fraction, and complicated management was required with them. A wide range of therapeutic strategies was employed, reflecting the diversity of underlying pathologies and emphasizing the importance of individualized treatment planning using both endoscopic and surgical approaches. Interventions were generally effective in relieving obstruction, with postoperative complications being manageable and largely related to infection or procedure-specific issues. Overall, the findings underscore the value of early diagnosis, appropriate etiological assessment, and tailored management in improving clinical outcomes for patients with obstructive jaundice.

References

1. Saddique M and Iqbal SA. Management of obstructive jaundice: Experience in a tertiary care surgical unit. Pak J Surg. 2007;23(1):23-25.
2. Gaffor A, Buladi GQ and Imran M. Role of imaging in obstructive jaundice. J Surg Pak Sep. 2004;9(3):24-26.
3. Khuram M, Durani AA, Hassan Z, ul Ala Butt A and Ashfaq S. Endoscopic retrograde cholingopancreatography evaluation of patients with obstructive jaundice. J Coll Physicians Surg Pak. 2003;13(6):325-328.
4. Acalovschi M. Cholangiocarcinoma: Risk factors, diagnosis and management. Rom J Intern Med Rev Roum Med Interne. 2004;42(1):41-58.
5. Padhy B, Murmu D, Samal D and Jha S. Clinical study of surgical jaundice: An institutional experience. Int Surg J. 2017;5(1):138-142.
6. Saadoon SN. Review of the causes of obstructive jaundice and the role of endoscopic retrograde cholangiopancreaticography (ERCP) in the management. Iraqi J Med Sci. 2016;14(4):359-365.
7. Chalya PL, Kanumba ES and Mchembe M. Etiological spectrum and treatment outcome of obstructive jaundice at a university teaching hospital in Northwestern Tanzania: A diagnostic and therapeutic challenges. BMC Res Notes. 2011;4(1):147.
8. Zollinger MD, Roger D, Williams MD, Dan W, Elliott MD, Robert M. Ama Arch Surg. 1960;80(6):992-997.
9. Goyani B, Ukani B, Patel M, Shah B and Vadel M. Ultrasonography and magnetic resonance cholangiopancreatography correlation in patients with obstructive jaundice. Int J Med Sci Public Health. 2015;4(7):1010-14.
10. Gupta AK, Singh A, Goel S and Tank R. Profile and pattern of obstructive jaundice cases from a tertiary care teaching hospital of Uttar Pradesh. Int Surg J. 2017;4(2):743-746.
11. Miller JR, Aggenstoss AH and Comfort AH. Malignant obstructive jaundice. Cancer. 1951; 4:233.
12. Garcea G, Ngu W, Neal CP, Dennison AR and Berry DP. Bilirubin levels predict malignancy in patients with obstructive jaundice. HPB. 2011;13(6):426-30.
13. Chaudhry SM, Khan AZ, Chohan S, Ch WM and Ghufran S. Bilirubin level as a predictor of malignancy in patients with obstructive jaundice. J Fatima Jinnah Med Univ. 2017;11(2): 22-6.
14. Hayat JO, Loew CJ, Asrress KN, McIntyre AS and Gorard DA. Contrasting liver function test patterns in obstructive jaundice due to biliary structures and stones. QJM. 2005;98(1):35-40.
15. Wang L and Yu WF. Obstructive jaundice and perioperative management. Acta Anaesthesiol Taiwanica. 2014;52(1):22-29.
16. Kurian JM and John PK.Assessment of clinical profile of patients with obstructive jaundice. Int J Contemp Med Res. 2015;4(1):4.
17. Sanie B. Surgical palliative drainage in un-resectable malignant biliary obstruction. J Vasc Med Surg. 2016;4(4):1-4.
18. Dalwani AG and Shaikh AR. Devanand Evaluation of Various Causes and Treatment of Obstructive Jaundice at Liaquat University Hospital {Original Article (Medicine)} Corpus ID: 53077822