

## **Prevalence of Pancreaticobiliary Maljunction (PBM) Among Sudanese Patients with Obstructive Jaundice in Ibsina Specialized Hospital**

Alaa Omer Altayeb<sup>1</sup>, Abdulmagid Mohammed MUSAAD<sup>2</sup>, Nassir Alhaboob Arabi<sup>3</sup>,  
Mohammed Nagmeldin<sup>4</sup>

1. Registrar of General Surgery, Ibn Sina Specialized Hospital, Sudan.
2. Professor of GI surgery, Ibn Sina Specialized Hospital.
3. Assistant Professor of surgery, Ibn Sina Specialized Hospital.
4. MD, Radiology, Fedail hospital.

**Corresponding Author:** Email: [alaaomeral27@gmail.com](mailto:alaaomeral27@gmail.com)

### **Abstract:**

**Background:** pancreaticobiliary maljunction is a congenital malformation in which the pancreatic and bile ducts join outside the duodenal wall. The common channel is long that leads to continuous reciprocal reflux between pancreatic juice and bile, resulting in various pathologic conditions in the biliary tract and pancreas.

**Methods and patients:** This is a hospital based descriptive cross-sectional study, which was conducted in Ibn Sina Specialized Hospital over a period of one year (August 2018 – August 2019). The study included 62 patients. Data was collected using a constructed structure pretest questionnaire.

**Results:** the mean age of the patients was 50.5, with male to female ratio 1:2.1. The majority of patients presented with the symptoms of bile obstruction. MRCP was done for all patients; showed that CBD stones was the most common diagnosis in 82.3 % (n=51), followed by pancreatic carcinoma 6.5% (n=4).

PBM found in 35.5 % (n= 22); the majority were type B 24.2% (n=15).

In patients with CBD stones 82.3 % (n=51), PBM type B was the most common anomaly found 23.5% (n=12), the serum direct bilirubin was <5 mg/dl in 78% (n=40), and ALP more than 300 U/L in the majority of them.

**Conclusion :** The prevalence of PBM is 35.5% , commonly found in female. The most common type of PBM is - type B, commonly found in patients with obstructive jaundice due to CBD stones.

**Keywords:** pancreaticobiliary maljunction , MRCP ,common bile duct stones .

## **Introduction :**

The classic description of the extrahepatic biliary tree and its arteries applies only in about one third of patients. Pancreaticobiliary maljunction (PBM) is a congenital malformation in which the pancreatic and bile ducts join anatomically outside the duodenal wall<sup>(1)</sup>. It was first reported in 1916, and many years passed without it attracting further attention<sup>(2)</sup> until Babbitt reported an anomalous arrangement of the pancreatobiliary ductal system in 1969<sup>(3)</sup>. In Japan, this concept was introduced by Komi et al. in 1976, and then widely recognized as an abnormal union of biliopancreatic ducts or anomalous junction of the pancreaticobiliary ductal system. <sup>(1)</sup> Alonso-Lej et al.<sup>(4)</sup> and Yotuyanagi <sup>(5)</sup> described the narrowed duct distal to the biliary cyst as a “narrow part of the terminal bile duct”, while, Babbitt et al. <sup>(6)</sup> described it as a long common channel which was thought to arrest the normal inward migration of the choledochopancreatic junction <sup>(7)</sup>

The Japanese Study Group on Pancreaticobiliary Maljunction (JSPBM) developed from a small conference of Japanese specialists to discuss the diagnosis of this anomaly in 1983, and proposed the diagnostic criteria of PBM in 1990. Accordingly the types of confluence between the terminal CBD and pancreatic duct classified into three types ; type A (known as C–P type, choledochal type, or right angle type), the common bile duct is likely to join the pancreatic duct, type B (known as P–C type, pancreatic type, or acute-angle type), the pancreatic duct seems to join the choledochus, type C (known as complex type) implies complicated union of the pancreaticobiliary ductal system.<sup>(8)</sup>

In PBM the common channel is so long that action of the sphincter of Oddi does not directly affect the pancreatobiliary junction. This leads to reciprocal reflux of pancreatic juices and bile. Persistence of reflux of pancreatic juice injures the epithelium of the biliary tract and promotes cancer development, resulting in higher rates of carcinogenesis in the biliary tract of PBM.<sup>(8)</sup>

## **Patients and Methods:**

This study was a combined retro-prospective descriptive analytical study, it was a cross-sectional and hospital based study, and was conducted during twelve months' period, from August 2018 to August 2019, it was conducted in Ibsina

specialized hospital ; gastroenterology and hepatobiliary unit, in Khartoum state. The data was collected by direct interview from patients in the referred clinic and from admitted patients from their medical records, investigations, and MRCP. Study population were all patients with obstructive jaundice who presented to hepato-biliary unit in Ibn Sina hospital during the study period. Data was collected by using an administered questionnaire filled with direct interview with patients in hospital, following the agreed consent of those patients.

**Results:**

62 patients with obstructive jaundice were included in this study, male to female ratio was 1:2.1. The highest percentage of the patients 43.5% (n=27) aged between 41-60 years (table-1), and mean age being 50.5. The majority of patients presented with the symptoms of bile obstruction (jaundice, itching, dark urine).

**Table (1): Shows age group distribution (n=62)**

Age of the patient	N	%
20-40	18	29
41-60	27	43.5
>60	17	27.4
<b>Total</b>	<b>62</b>	<b>100</b>

MRCP was done for all patients and showed that CBD stones was the most common diagnosis in

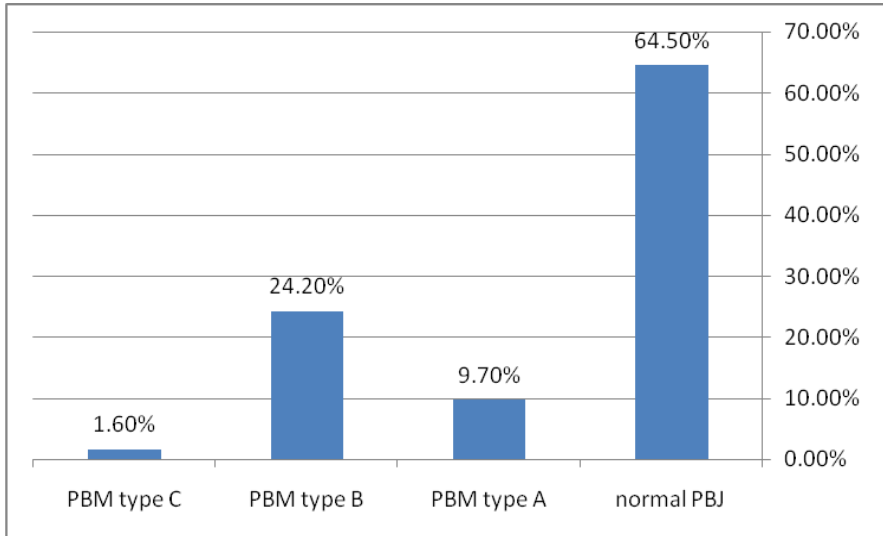
82.3 %(n=51), followed by pancreati

**Table (2): Shows the diagnosis of the patients**

Diagnosis	N	%
CBD Stone	<b>51</b>	<b>82.3</b>
Pancreatic Carcinoma	<b>4</b>	<b>6.5</b>
Cholangiocarcinoma	<b>2</b>	<b>3.2</b>
Choledochal Cyst	<b>1</b>	<b>1.6</b>
GB Carcinoma	<b>1</b>	<b>1.6</b>
CBD Stricture	<b>3</b>	<b>4.8</b>
<b>Total</b>	<b>62</b>	<b>100</b>

The majority of those aged 41-60 64.5%(n=40) had normal pancreaticobiliary junction (figure - 1)

PBM found in 35.5%(n= 22), the most common anomaly found was PBM type B 24.2% (n=15);the majority of them in patients with CBD stones 80%(n=12). In patient with CBD stones 82.3%(n=51) PBM type B was the most common a 23.5% (n=12)(table-3).



**Figure (1) : Shows types of PBM in the patients(n=62)**

**Table (3): Shows the PBM in relation to the disease (n=62)**

MRCP Finding	CBDStone	Pancreatic Carcinoma	Cholangio-Carcinoma	Choledochal Cyst	GB Carcinoma	CBD Stricture
<b>Normal PB junction</b>	N= 33 (64.7%)	N= 2 (50%)	N= 1 (50%)	N 1 (100%)	0	N= 3 (100%)
<b>PBM type A</b>	N= 6 (11.8%)	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PBM type B</b>	N= 12 (23.5%)	N= 1 (25%)	N= 1 (50%)	<b>0</b>	N=1 (100%)	<b>0</b>
<b>PBM type C</b>	N= 0	N= 1 (25%)	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total</b>	N=51 % (100%)	N= 4 % (100%)	N= 2 % (100%)	N= 1 % (100%)	N= 1 % (100%)	N= 3 % (100%)

In patient with CBD stones, the serum total bilirubin was found <5 mg/dl in 66 % (n=34),direct bilirubin was < mg/dl in 78%(n=40).( table 4&5)

**Table (4): Level of total bilirubin in relation to disease**

Diagnosis	Serum total bilirubin < 5mg/dl	Serum total bilirubin 5- 10 mg/dl	Serum total bilirubin > 10 mg/dl
CBDSStone	34	10	7
PancreaticCarcinoma	0	0	4
Cholangiocarcinoma	0	1	1
CholedochalCyst	1	0	0
GB Carcinoma	1	0	0
CBDSStricture	2	1	0

**Table (5) : Level of direct bilirubin in relation to disease**

Diagnosis	Serum total bilirubin < 5mg/dl	Serum total bilirubin 5- 10 mg/dl	Serum total bilirubin > 10 mg/dl
CBDSStone	40	5	6
PancreaticCarcinoma	0	0	4
Cholangiocarcinoma	1	0	1
CholedochalCyst	1	0	0
GB Carcinoma	1	0	0
CBDSStricture	3	0	0

### **Discussion:**

The study investigated the prevalence of PBM among Sudanese patients with obstructive jaundice in Ibsina specialized hospital from August 2018 to August 2019 male to female ratio was 1:2.1 with mean age being 50.5, as well as it has been found in different studies done in Japan in 2019, 2018 and 2003 about the PBM; the incidence was significantly more common in females<sup>(9)</sup>.

According to a nationwide survey done by Yuji Morine ,Mitsuo Shimada ,Hideo akamatsu,et al, in Japan2013which included 2561 patients the mean age at which PBM patients developed biliary cancer was 60.1 years for gallbladder cancer and 52.0 years for bile duct cancer among patients with congenital biliary dilatation, and 58.6 years for gallbladder cancer in PBM patients without biliary dilatation.<sup>(10)</sup>. Another study done in Japan by Terumi Kamisawa, Goro Honda,

Masanao Kurata, etc al. about pancreatobiliary disorders associated with pancreatobiliary maljunction done between 1973 to 2009 where the majority of the patients were females with a mean age of 49 years<sup>(11)</sup> In this study the majority of the patients with CBD stones were found in younger age between 41- 60 years , while the majority of patients with pancreatic carcinoma ,CBD stricture and choledochal cyst were found in older age above 60 years, with significant P value 0.007, GB cancer found in one patient with age 32 years .

Supporting this, the result of the study done by Yoshiro Matsumoto, Hideki Fujii, Jun Itakura ,et al, about the pathophysiology of PBM and its impact on biliary carcinogenesis in 2003; which showed that the patients with benign biliary disease and pancreatic disease tend to occur in younger age compared to tumours of the biliary tract (mean age 56\_12 years, 63\_11 years respectively).<sup>(7)</sup> as it was found in the study done in 2000 about the precancerous conditions of biliary tract cancer in the patients with PBM<sup>(12)</sup>.

Against this, the study of pancreatobiliary disorders associated with pancreatobiliary maljunction done in Japan between 1973 to 2009 by Terumi Kamisawa, Goro Honda, Masanao Kurata, etc al. showed that patients with PBM-associated bile duct carcinoma; the age at diagnosis was significantly lower (14 years) in the patients with gallbladder carcinoma associated with PBM than in those without PBM.<sup>(11)</sup>

Of 62 patients in this study regardless of the diagnosis ;64.5%(n=40) of them had normal pancreatobiliary junction; the most common anomaly found is PBM type B in 24.2 % (n=15) , followed by PBM type A 9.7%(n=6), In relation to diagnosis, CBD stones was the most common disease reported 82.3 % (n=51) ; in these patients we found that 64.7%(n=33) had normal pancreatobiliary junction , 23.5% (n=12) had PBM type B , 11.8%(n= 6) had PBM type A , and there was no patients reported with PBM type C.

These results showed that there was relation between the presence of PBM type B and CBD stones, and it could be resulting from the reflux of pancreatic enzymes into CBD , this need more studies to know the pathophysiology of it.

Supporting this ,the study done by Yoshitsugu Kubota, Takashi Yamaguchi, Kazuhiro Tani, et al. about anatomical variation of pancreatobiliary ducts in biliary stone diseases showed that some of the anatomical variations in the pancreatobiliary ductal system may play an important etiological role in the formation of stones either in the gallbladder or in the common bile duct.<sup>(13)</sup>

Although there was a study done by Kensuke Yoshimoto, Terumi Kamisawa, Asataka Kikuyama, et al. in 2015 about the classification of pancreato-biliary junction and its clinical features in adults: PBM type A in 32.7%, PBM type B in 57.1%, PBM type C in 6.5%, and PBM type D in 3.6%. (type D had complete pancreas divisum, but PBM type B was significantly more frequent in GB carcinoma than in other types<sup>(14)</sup>).

Against this study, the Japan-nationwide survey 2013 done by Yuji Morine, Mitsuo Shimada, Hideo Takamatsu, et al.; PBM type A was significantly more frequent in patients with biliary dilatation and PBM type B was more frequent in patients without biliary dilatation.<sup>(8)</sup> ++

A retrospective and nationwide survey about PBM done in 2003 in Japan by Seiki Tashiro, T. Imaizumi, H. Ohkawa, et al. showed that; PBM Type A was significantly higher compared with the other types, and the patients with congenital biliary dilatation were more predisposed to forming biliary tract stones than individuals without congenital biliary dilatation. In patients with bile duct dilatation; PBM type A was significantly more frequent compared with the other types.

In patients without dilatation of the bile duct; PBM type B being significantly more, the presence of gallstone and morphological abnormality of the gallbladder was significantly more frequent in those without biliary dilatation<sup>(5)</sup>

In this study; 4 patients suffered from pancreatic head cancer (6.5%); two of them had normal pancreato-biliary junction, one had PBM type B and one patient had PBM type C, 3 patients had CBD stricture (4.8%), 2 patients had cholangiocarcinoma (3.2%); the small number of patients may be explained by that: the majority of patients who presented with features of malignant obstructive jaundice diagnosed based on CT abdomen rather than MRCP.

A study done in 2009 by Takahiko Funabiki & Toshiki Matsubara, et al. about PBM and carcinogenesis to biliary tract showed that pancreatic cancer associated with PBM was rare compared to bile duct, and gallbladder cancer.<sup>(15)</sup>

Unlike our study, in a nationwide survey done by Yuji Morine, Mitsuo Shimada, Hideo Takamatsu, et al. in Japan 2013; biliary cancer was detected in 21.6% of adult patients with congenital biliary dilatation (bile duct cancer, 32.1% vs. gallbladder cancer, 62.3%) and in 42.4% of PBM patients without biliary dilatation (bile duct cancer, 7.3% vs. gallbladder cancer, 88.1%).<sup>(10)</sup>

In this study the majority of patients with CBD stones had serum total bilirubin < 5mg/dl, and serum direct bilirubin < 5mg/dl , with significant P value 0.01 in both - no significant relation between the serum ALP and diseases; there is no published study reporting this.

In this study the majority of patients presented with the features of biliary obstruction regardless their diagnosis (CBD stones, cholangiocarcinoma, pancreatic cancer, GB cancer ,CBD stricture, choledochal cyst ), which was not significant p value reported between the disease and clinical presentations - and no other studies mention this.

## **References:**

1. Kamisawa T, Ando H, Hamada Y, Fujii H, Koshinaga T, Urushihara N, et al. Diagnostic criteria for pancreaticobiliary maljunction 2013. 2014;159–61.
2. Kamisawa T, Ando H. Pancreaticobiliary Maljunction and Congenital Biliary Dilatation.2018
3. Todani T, Todani T, Arima E, Eto T, Funabiki T, Kakita A, et al. Special topics Diagnostic criteria of pancreaticobiliary maljunction THE JAPANESE STUDY GROUP O PANCREATOBILIARY. 1994;219–21.
4. Kaneko K, Ando AEH, Seo AET. Bile infection contributes to intrahepatic calculi formation after excision of choledochal cysts. 2005;8–11.
5. Surg HP. Pancreaticobiliary maljunction : retrospective and nationwide survey in Japan. 2003;345–51.
6. Surg HP. Recent advances in pancreaticobiliary maljunction. 2002;45–54.
7. Horizons NEWS. Pancreaticobiliary maljunction : pathophysiological and clinical aspects and the impact on biliary carcinogenesis. 2003;122–31.
8. Morine Y, Shimada M, Takamatsu H, Araida T. Clinical features of pancreaticobiliary maljunction : update analysis of 2nd Japan-nationwide survey. 2013;472–80.
9. Nordin A, Pakarinen MP. Original Research Article. 2019;1–6.
10. Kamisawa T, Kuruma S, Tabata T. Pancreaticobiliary maljunction and biliary cancer. 2014;Papilla MD. Pancreatobiliary Disorders Associated with Pancreaticobiliary Maljunction. 2010;8677:100–4.
11. Hasumi A, Matsui H, Sugioka A, Uyama I, Komori Y, Fujita J. Precancerous conditions of biliary tract cancer in patients with pancreaticobiliary maljunction : reappraisal of nationwide survey in Japan. 2000;551–5.
12. Kubota Y, Yamaguchi T, Tani K, Takaoka M, Fujimura K, Ogura M, et al. Abdominal Imaging Anatomical Variation of Pancreatobiliary Ducts in Biliary Stone Diseases. 1993;149:145–9.



13. Yoshimoto K, Kamisawa T, Kikuyama M, Kuruma S, Chiba K, Igarashi Y. Classification of pancreaticobiliary maljunction and its clinical features in adults. *J Hepatobiliary Pancreat Sci.* 2019;
14. Funabiki T, Matsubara T. Pancreaticobiliary maljunction and carcinogenesis to biliary and pancreatic malignancy. 2009;159–69.