

**STUDY OF GALL BLADDER DISEASE IN DIABETIC & NON DIABETIC PATIENTS**Sanjeev Agarwal<sup>1</sup>, Lalit Shrimali<sup>2</sup>, Ritu Mehta<sup>3</sup>, C. P. Joshi<sup>4</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT: BACKGROUND:** Diabetes Mellitus is one of the factors causing cholesterol gallstone. We planned this study to find out prevalence of gall bladder disease in diabetic patients and compare with non-diabetic patients in age and sex matched control in relation with mortality, morbidity and postoperative complications. **MATERIAL & METHOD:** The present study was conducted on 100 patients, out of which 50 patients have diabetes with gall bladder disease and 50 patients age and sex matched control with gallbladder disease who have no history or evidence of diabetes mellitus. **RESULTS:** Peak incidence was found in between 30 to 50 years of age. Male and female ratio was 1:5. Commonest presenting symptom was mild to moderate right hypochondrium pain. Chronic cholecystitis with cholelithiasis was the commonest presentation of gallbladder disease in both groups whereas empyema was seen more in diabetic patients. Most of the patients were treated by cholecystectomy and post-operative complications were significantly higher in diabetic patients with longer hospital stay. Mortality rate was also higher in diabetic patients with gall bladder disease as compared to non-diabetics. **CONCLUSION:** Gall bladder disease especially empyema of gall bladder was much higher in diabetics as compared to non-diabetics. We found that diabetes confers as increase in risk with biliary tract surgery. So the early diagnosis with the help of ultrasonography and early surgical intervention should be considered in diabetics with gall bladder disease to decrease the incidence of post-operative morbidity and mortality.

**KEYWORDS:** Gall bladder; Diabetes mellitus; Gallstones.

**INTRODUCTION:** It has been assumed that patients with diabetes are at an increased risk of developing gallstones. The incidence of gall stones in diabetics ranges from 6-34 percent. However, diabetes as an independent risk factor in cholelithiasis has been difficult to prove.

The bile of patients with diabetes mellitus is super saturated with cholesterol.<sup>1</sup> However, the fasting gall bladder volume of diabetic subjects is greater than that of controls, suggesting that diabetic subjects have a hypotonic gall bladder leading to possible stasis and subsequent formation of gall stones.<sup>2</sup> Diabetic gall bladder becomes less responsive to stimulus after fatty meals and after infusion of cholecystokinin, due to changes in smooth musculature.

The operative mortality with emergency surgery for acute complications of cholelithiasis in diabetic patients had been reported to be 4.5 times as great as that for a similar group of non-diabetic patients.

Though the precise relation of diabetes mellitus to gall bladder disease continues to be controversial, this study aims to determine the consequences of gall bladder disease among diabetic patients and compare it with a similar group of non-diabetics.

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The combination of inflammatory disease of the biliary tract and diabetes mellitus has long been considered a special problem. Questions have included whether or not the gall bladder diseases are more common in diabetics and whether or not it is different in those with non-diabetics.

The incidence of gall stone in diabetics ranges from 6 to 34% (average 25%). Warren,<sup>3</sup> in a study found that gall stones occur more commonly in diabetics than in non-diabetic patients. In his study of 453 diabetic patients 31% of diabetics had gall stones whereas only 21% of control series of 500 non diabetic patients had gall stones.

Feldman & Fedman<sup>4</sup> in a series of autopsies (1319) found gall stones in 24.8% of diabetic cases against 22.7% of all cases studied. Similarly Zahore et al<sup>5</sup> found no association between gall stones and diabetes in a Swedish population.

It is still believed that gall stones are more common in those with diabetes (Falchuk K R and Ferguson B D<sup>6</sup>). Pancreatitis also shown by Robinowitch<sup>7</sup> to have a high incidence in diabetes was noted by Bockus<sup>8</sup> to be preceded in most cases by Cholelithiasis. Jones<sup>9</sup> states: "In adults, cholelithiasis is probably one of the most important etiologic factors in diabetes mellitus". Stone et al<sup>10</sup> confirmed these findings and added that decreased gall bladder emptying found in diabetics was not related to obesity, type of diabetes, diabetic control or presence or absence of peripheral neuropathy. The most severe impairment of gall bladder emptying occurred, however, in diabetics with an associated autonomic neuropathy.

Bile lipid composition was thus more favorable to cholesterol precipitation and gall stone formation during insulin treatment than in the untreated diabetic state (Idem<sup>11</sup>).

However in 1979, Haber and Heaton<sup>12</sup> suggested that gall stones may not be caused by diabetes but rather share a major etiological factor with it. Obesity is a strong risk factor for both cholesterol gall stones and maturity onset diabetes.

Perforation of gall bladder occurs supposedly more often in those with diabetes (Schein,<sup>13</sup> Sandler et al<sup>14</sup>). A review of several series of patients with this complication reveals a 16 to 25 percent incidence of diabetes (Roslyn J, Thompson J E<sup>15</sup>). Older patients with atherosclerosis are probably at an increased risk of perforation (Roslyn J and Busuttill R W<sup>16</sup>).

Emphysematous cholecystitis is another possible manifestation of the alleged crescendo progression in those with diabetes (Larkin et al<sup>17</sup>). This is usually caused by anaerobic bacteria and is more common in elderly men.

Diabetes Mellitus is defined as chronic hyperglycemia which may results from many environmental and genetic factors often acting jointly. It is one of the most extensively studied systemic diseases related to "Gall bladder diseases" because it is believed that patients with diabetes are more prone to develop complications associated with cholelithiasis.

### **MATERIALS & METHOD:**

**Grouping of Subjects:** The following groups of subjects for study were made viz.

**Group I (n=50):** This group consisted of diagnosed patients of diabetes with gall bladder disease who fulfill the following criteria.

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- a) Symptoms of diabetes plus random plasma glucose concentration > 200mg/dl. **OR**
- b) Fasting plasma glucose > 126mg/dl (Fasting is defined as no caloric intake for at least 8 hours). **OR**
- c) Following ingestion of 75gm glucose, venous plasma glucose concentration > 200mg/dl at 2 hours.

**Group II (n=50):** This group consisted of fifty patients with age & sex matched who were having gall bladder disease. It was assured that none of the patient selected had any history / evidence of diabetes mellitus. Then both the groups were compared in relation to age & sex, clinical presentation and most of the patients were treated by cholecystectomy in both the groups & then compared in relation to complications, average hospital stay and mortality rate.

**OBSERVATIONS:** Table 1 shows that most of the patients were between 30-60 years of age (76%).

Table II shows that majority of patients with Gall bladder disease & diabetes were females (84%).

Table III shows that right hypochondrium pain or diffuse abdominal pain was the most common symptom. It was present in 100% of the cases. Right hypochondrium tenderness was the most common sign elicited and was present in 40% of diabetic cases and 32% of non-diabetic cases.

Table IV shows that the main bulk of patients belonged to chronic cholecystitis with cholelithiasis in both the groups, 64% of cases from diabetic group and 68% of cases from non-diabetic group. Four percent of patient with diabetes were diagnosed to have acalculous cholecystitis while none of the non-diabetic patients had acalculous cholecystitis. Empyema was present only in the diabetic group (16%).

Table V shows that in most of the patients laparoscopic cholecystectomy was performed. In the diabetic group 76% patients had laparoscopic cholecystectomy, 20% had open cholecystectomy while 4 % had cholecystostomy. In the non-diabetic group apart from laparoscopic cholecystectomy (88%), open cholecystectomy was done in the 8% of the cases and 4% had cholecystectomy with CBD exploration.

Table VI shows that the risk of post-operative complications increases with increase in age in both the groups. The morbidity in the 7<sup>th</sup> decade of life approaches 30% in the diabetic group. Thus the age of the patients undergoing surgery for cholelithiasis had considerable influence on the morbidity.

Table VII shows that the risks of post-operative complications were almost equal in both the sexes.

The Table VIII shows that the post-operative complications were more common in patients with severe diabetes (37.5%) as compared to the patients with mild diabetes (5.88%).

**DISCUSSION:** Clinical experience has long suggested that patients with diabetes mellitus have an increased risk of developing gallstones, as compared to non-diabetics (Roslyn<sup>15</sup>). A rational explanation for this finding is derived from the observation that diabetic patients have

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supersaturated bile with cholesterol, a reduced bile acid pool and impaired gall bladder motor activity. Furthermore, there is some evidence to suggest that treatment of diabetes with insulin actually exacerbate the predisposition of gall stone formation by increasing the degree of cholesterol saturation of bile.

In the present study 76% of the diabetic patients were between 30-60 years of age. The peak incidence was found to be between 31-50 years of age. The average age of the diabetic patients with gall bladder disease was 49 years. Patients with the maximum age were of 70 years and with the minimum age were of 30 years in this group. In Abramson's<sup>18</sup> study age ranged from 32 to 77 years (average 58 years). In Mundth's<sup>19</sup> study average age was 66 years and in Schein's<sup>13</sup> study 67% of the patients were over the age of 60 years. In Turills<sup>20</sup> study average age was 61 years.

In this Study 16% of the diabetic patients were male and 74% were females. The male: female ratio correlates with Eisele's<sup>21</sup> study, but differs from Abramson's<sup>18</sup> where male to female ratio was 1:3 and Schein's<sup>13</sup> and Sandler's<sup>14</sup> studies where male to female ratio was 1:2.

The commonest presenting symptom was pain in the right hypochondrium in both the groups. Pain was present in 90% of the diabetic cases in the Eisele's<sup>21</sup> study.

The main bulk of patients (66%) belonged to chronic cholecystitis with cholelithiasis, 64% of cases were from the diabetic group and 68% were from the non-diabetic group. Acute calculus cholecystitis was detected in 12% cases of the diabetic group and 16% cases of the non-diabetic group. In our study chronic cholecystitis has covered higher percentage compared to acute cholecystitis while in Mundth's<sup>19</sup> study both acute and chronic cholecystitis were 50% each. Schein<sup>13</sup> presented his study with acute cholecystitis in 71.2% cases and chronic cholecystitis in 28.8% cases.

In the diabetic group other patients were diagnosed to have acalculous cholecystitis (4%) and empyema gall bladder (16%). None of the patients in the non- diabetic group had acalculous cholecystitis or empyema gall bladder.

Cholecystectomy was done in 96% of the patients with diabetes and & without diabetes. Rest of the patients of the diabetic group (4%) was operated by cholecystostomy.

Cholecystectomy, was the most common operation performed in other studies also. Schein's<sup>13</sup> study shows 84% cholecystectomies. Abramson<sup>18</sup> presented his study with 76% cholecystectomy rate while it was 59% in Mundth's<sup>19</sup> study. Considering cholecystectomy with common bile duct exploration our percentage of patients was less (4%) than the different studies of Abramson, Mundth and Schein, where cholecystectomy with CBD exploration ranged between 24% to 38%.

Postoperative complications were markedly high in diabetics having gall bladder disease as compared to non-diabetics with gall bladder disease. It was observed that the total number of patients having complications post-operatively were 16% in the diabetic group and 8% in the non- diabetic group. Sandler<sup>14</sup> reported the complication rate in both the groups as 24.6% & 12.5% which is comparable to our study. In Turrill<sup>20</sup> (1961) study postoperative complication were present in 53% of the diabetic patients and 21% of the non-diabetic patients. Ransohoff<sup>22</sup> observed a complication rate of 52.9% and 39.1% in the diabetic and non-diabetic groups, respectively. In our study risk of postoperative complications increases with increase in age in

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both the group. The morbidity in the patients in 4<sup>th</sup> decade of life was about 6.25%, but it approached 30% in the patients in their 7<sup>th</sup> decade in diabetic group. Thus, the age of the patients undergoing surgery for cholelithiasis has considerable influence on the morbidity. Sandler<sup>14</sup> reported 21% of complication rate in patients less than 55 years of age. The influence of age on the mortality and morbidity had also been confirmed by Mundth<sup>19</sup> and Turrill.<sup>20</sup>

In the present study the rate of postoperative complications were 25% in the male diabetic patients & 14.8% in female diabetic patients. Our study correlates with Sandler's<sup>14</sup> study who stated that the male sex was associated with an increased risk of postoperative morbidity. He observed 33% percent complication rate in male diabetics and 21% complication rate in female diabetics.

In this study complication rate was also studied with reference to the severity of the diabetes. It was evident that the post-operative complications were more common in patients with severe diabetes (37.5%) as compared to the patients with mild diabetes (5.88%).

The present study recorded 2 % mortality rate in the diabetics with gall bladder disease. Whereas it was 7% in Ransohoff<sup>22</sup> study.

**SUMMARY & CONCLUSIONS:** It is concluded that the incidence of gall bladder disease especially empyema of gall bladder was much higher in diabetics as compared to non-diabetics. We found that diabetic patients were at increased risk with biliary tract surgery. The risk increases with severe & long standing diabetes and with acute presentation of gall bladder disease. So the early diagnosis with the help of ultrasonography and early surgical intervention should be considered in diabetics with gall bladder disease to decrease the incidence of post-operative morbidity and mortality.

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Age	Gall bladder with Diabetes	
	Cases	Percentage
21-30	2	4%
31-40	16	32%
41-50	14	28%
51-60	8	16%
61-70	10	20%

**Table I: Distribution of Cases According to Age**

Sex	Gall Bladder with Diabetes	
	Cases	Percentage
Male	8	16%
Female	42	84%

**Table II: Distribution of cases According to Sex**

Symptoms	Diabetes (%)	Non Diabetes (%)
• Pain RHC or diffuse	100	100
• Nausea & Vomiting	56	64
• Flatulent dyspepsia	40	24

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• Fever	16	4
• Jaundice	-	8
<b>Sings</b>		
• Rigidity	24	12
• RHC tenderness	40	32
• Positive Murphy's sign	28	24
• Hepatomegaly	8	4
• Palpable gall bladder	4	4

**Table III: Clinical Presentation (Gall Bladder Disease)**

Operative Findings	Diabetic		Non Diabetic	
	No. of cases	%	No. of cases	%
Acalculus cholecystitis	2	4	0	0
Acute cholecystitis with cholelithiasis	6	12	8	16
Chronic cholecystitis with cholelithiasis	32	64	34	68
Mucocele gall bladder	2	4	4	8
Empyema gall bladder	8	16	0	0
Cholecystitis with CBD stone	0	0	4	8

**Table IV: Distribution of cases According to Operative Finding**

Operation	Diabetic		Non diabetic	
	No. of Cases	%	No. of Cases	%
Cholecystectomy	10	20	4	8
Cholecystectomy with choledocholithotomy	0	0	2	4
Cholecystostomy	2	4	0	0
Laparaoscopic Cholecystectomy	38	76	44	88

**Table V: Operative Procedures Undertaken**

Age group	Diabetic Patients			Non Diabetic Patients		
	No. of Pts.	No. of Postoperative complications	%	No. of Pts.	No. of Postoperative complications	%
20-30	2	-	-	2	-	-
31-40	16	1	6.25	16	-	-
41-50	14	2	14.28	14	1	7.14
51-60	8	2	25	8	1	12.5
61-70	10	3	30	10	2	20

**Table VI: Comparative morbidity for diabetic and non-diabetic patients in Comparable age groups undergoing surgery**

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Sex	Diabetic Patients			Non Diabetic Patients		
	No. of Pts.	No. of Postoperative complications	%	No. of Pts.	No. of Postoperative complications	%
Male	8	2	25	8	1	12.5
Female	42	6	14.28	42	3	7.14

**Table VII: Risk of Post-operative complications according to the sex of patients**

Severity of Diabetes	No. of Cases	No. of Complications	Percentage
Severe	16	6	37.5
Mild	34	2	5.88

**Table VIII: Post-operative complications in the diabetic patients with reference to the severity of the diabetes**

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