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Original Research Article.

Analysis of Prevalence of Cholelithiasis in Patients with Type 2 Diabetes Mellitus: A Clinical Study

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ABSTRACT

Background: Diabetes mellitus is a group of metabolic diseases characterized by chronic Hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Gallstone disease (GD) constitutes a significant health problem in developed societies, affecting 10% to 15% of the adult population. Hence, the present study was undertaken for assessing the prevalence of Cholelithiasis in patients with type 2 diabetes mellitus.

Materials & Methods: A total of 250 patients with presence of type 2 diabetes mellitus were enrolled in Department of General Medicine, ICARE Institute of Medical Sciences and Research and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India. Only those patients were enrolled who had confirmed diagnosis of type 2 diabetes for a minimum of ten years. Patients were interviewed to obtain the complete demographic, clinical and personal details of all the patients. History of cholecystectomy, history of Gallbladder stones (GBS), type of GBS was recorded separately. Two radiologists employed real-time ultrasound to examine the abdomen after an overnight fast.

Results: Prevalence of Cholelithiasis among type 2 diabetic patients was found to be 40.8 percent (102 patients). Among these 102 patients, 76 were females while the remaining 26 were males. Mean BMI was found to be higher among patients with gallstones diseases. Patients with gallstones had significantly higher mean duration of diabetes in comparison to patients with gallstones. Hence, female gender, higher BMI and higher mean duration of diabetes are significant risk factors of gallstone diseases.

Conclusion: From the above results, it can be concluded that diabetic patients are associated with significant risk for occurrence of Cholelithiasis.

Key words: Cholelithiasis, Diabetes.

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INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Metabolic abnormalities in carbohydrates, lipids, and proteins result from the importance of insulin as an anabolic hormone. Low levels of insulin to achieve adequate response and/or insulin resistance of target tissues, mainly skeletal muscles, adipose tissue, and to a lesser extent, liver, at the level of insulin receptors, signal transduction system, and/or effector enzymes or genes are responsible for these metabolic abnormalities. Diabetes is fast gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease. In 2000, India (31.7 million) topped the world with the highest number of people with diabetes mellitus followed by China (20.8 million) with the United States (17.7 million) in second and third place respectively.[1-4] India is maintaining top position till date. Gallstone disease (GD) constitutes a significant health problem in developed societies, affecting 10% to 15% of the adult population. It is estimated that 7% to 10% of the world's population has either symptomatic or asymptomatic cholelithiasis. Individuals with diabetes are at a higher risk of developing gallstones and acalculous gallbladder disease apart from gallstones. Cholelithiasis may progress more rapidly in patients with diabetes, which is due to chronic and severe infections of the gallbladder in diabetics. Globally, the reported prevalence of gallstone disease in diabetes mellitus is 36.2%. The cholelithiasis tends to occur predominantly among multiparous, obese women and in those who use combined oral contraceptives (OCPs). In postmenopausal women, hormone replacement therapy (HRT) increases the risk for cholelithiasis significantly due to its estrogen component, which is shown to cause biliary stasis. Its incidence increases with age and parity. One of the risk factors for gallstone

disease (GD) is diabetes mellitus type 2.[5- 9] Hence, the present study was undertaken for assessing the prevalence of Cholelithiasis in patients with type 2 diabetes mellitus.

MATERIALS & METHODS

In the present study, prevalence of Cholelithiasis in patients with type 2 diabetes mellitus was assessed. A total of 250 patients with presence of type 2 diabetes mellitus were enrolled in Department of General Medicine, ICARE Institute of Medical Sciences and Research and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India. Only those patients were enrolled who had confirmed diagnosis of type 2 diabetes for a minimum of ten years. Written consent was obtained from all the patients after explaining in detail the entire research protocol. Patients were interviewed to obtain the complete demographic, clinical and personal details of all the patients. History of cholecystectomy, history of GBS (patients with previous history of GBS were included), type of GBS (single or multiple) was recorded separately. Two radiologists employed real-time ultrasound to examine the abdomen after an overnight fast. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

Table 1: Prevalence of Cholelithiasis

Variable	Number
Number of patients with Cholelithiasis	102
Percentage of patients with Cholelithiasis	40.8%

Table 2: Risk factors of Cholelithiasis among patients with type 2 diabetes

Risk factors		Patients with Cholelithiasis (n=102)	Patients without Cholelithiasis (n=148)	p- value
Age group	**Less than 40**	62	88	0.12
	More than 40	40	60	
Gender	**Females**	76	76	0.00 (Sig)
	Males	26	72	
Mean duration of diabetes (years)		13.5	8.1	0.00 (Sig)
Mean BMI (Kg/m^2)		29.4	26.1	0.01 (Sig)

RESULTS

In the present study, a total of 250 diabetic patients were enrolled. Prevalence of Cholelithiasis among type 2 diabetic patients was found to be 40.8 percent (102 patients). Among these 102 patients, 76 were females while the remaining 26 were males. Mean BMI was found to be higher among patients with gallstones diseases. Patients with gallstones had significantly higher mean duration of diabetes in comparison to patients with gallstones. Hence, female gender, higher BMI and higher mean duration of diabetes are significant risk factors of gallstone diseases.

DISCUSSION

Diabetes is a group of metabolic diseases characterized by Hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic Hyperglycemia of diabetes is associated with micro and macrovascular complications. Several pathogenic processes are involved in the development of diabetes. These range from autoimmune destruction of the β-cells of the pancreas with consequent insulin deficiency to abnormalities that result in resistance to insulin action. The basis of the abnormalities in carbohydrate, fat, and protein metabolism in diabetes is deficient action of insulin on target tissues. Deficient insulin action results from inadequate insulin secretion and/or diminished tissue responses to insulin at one or more points in the complex pathways of hormone action.

Impairment of insulin secretion and defects in insulin action frequently coexist in the same patient, and it is often unclear which abnormality, if either alone, is the primary cause of the hyperglycemia.[9- 11] Several studies from across the world reported an increased prevalence of GBS in patients with DM. How diabetes predisposes to gallstones is not well understood. However, hypertriglyceridemia, autonomic neuropathy (leading to gallbladder hypomotility and biliary stasis) and hyperinsulinemia have been suggested as contributing factors to the increased risk of GBS development in diabetics.[12- 14] Hence; the present study was undertaken for assessing the prevalence of Cholelithiasis in patients with type 2 diabetes mellitus.

In the present study, a total of 250 diabetic patients were enrolled. Prevalence of Cholelithiasis among type 2 diabetic patients was found to be 40.8 percent (102 patients). Among these 102 patients, 76 were females while the remaining 26 were males. Mean BMI was found to be higher among patients with gallstones diseases. In a previous study conducted by Chapman BA et al, authors compared the prevalence of gallstone disease (gallstones observed on ultrasound or history of cholecystectomy) in 308 diabetics and 318 controls. There was a higher prevalence of gallstone disease (GSD) in diabetics (32.7%) compared to controls. However, when gender was considered, the difference was only significant in females. The proportion of subjects who underwent cholecystectomy was higher in females (46.7%)

compared to males (21.7%; P < 0.01) but there were no differences between diabetics and controls in either sex. There was a higher prevalence of GSD in diabetics compared to controls.[7] Sodhi JS et al determined the prevalence of gallstones (GS) in patients with T2D, risk factors, and the relative risk compared with subjects without diabetes, selected from the general population. Among 450 cases with T2D of a ≥2-year duration, 377 (88.8 %) participated. Gallstones were seen in 67 (17.7 %) cases compared to 40 (5.8 %) in controls (p = 0.001). Prevalence increased with increasing age with peak in the sixth decade (23.4 % in cases and 4.4 % in controls (p = 0.001) and was higher in women (27.9 %) in cases and (7.8 %) in controls, (p = 0.001). In univariate analysis, risk factors for GS included age, female sex, BMI, multiparity, family history of GS, and high triglycerides and cholesterol with low high-density lipoprotein cholesterol. In multivariate analysis, age, female sex, and BMI were the independent risk factors in gallstone formation. Patients with T2D had higher probability of having GS compared to the general population.[15]

In the present study, patients with gallstones had significantly higher mean duration of diabetes in comparison to patients with gallstones. Hence, female gender, higher BMI and higher mean duration of diabetes are significant risk factors of gallstone diseases. Experimental and epidemiologic studies support the concept that people with diabetes have a higher risk to cholelithiasis, although not universally accepted. Likewise, there is no consensus on what the most appropriate course of action towards the diabetic patient with gallstones is. The literature reports higher incidence of gallstone disease in diabetic patients, although this fact may be related to the dietary habits of people with diabetes, the common overweight in this condition or old age, rather than the diabetes itself. However, the autonomic neuropathy, when installed, could be responsible for lithiasic tendency in this group of patients. One study looked at 566 cholecystectomies for acute cholecystitis, 123 of these patients were diabetic, 433 nondiabetics. The diabetic group showed morbidity (21% vs. 9%) and significantly higher mortality rates. In a study of cases and controls with 72 emergency cholecystectomies, diabetic patients had more complications (38.9%) than nondiabetics (20.8%) did. Infection was the main cause, three times more frequent in diabetic patients. Validating these findings, a study with autopsies showed that although rare, severe complications and death from cholelithiasis were significantly more common in diabetic patients than in nondiabetics.[16- 18]

CONCLUSION

From the above results, it can be concluded that diabetic patients are associated with significant risk for occurrence of Cholelithiasis.

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