

ACUTE PANCREATITIS IN PATIENTS WITH DIABETIC KETOACIDOSIS PRESENTING AT A TERTIARY CARE UNIT

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ABSTRACT

Objective: To determine the frequency of acute pancreatitis among the patients diagnosed with diabetic ketoacidosis at our tertiary care hospital.

Study Design: Co-relational study.

Place and Duration of Study: Medicine department, Pak Emirates Military Hospital Rawalpindi, from Jun to Dec 2019.

Methodology: A total of 40 cases presenting with diabetic ketoacidosis were included in our study. Diabetic ketoacidosis was diagnosed by consultant medical specialist. All patients underwent baseline investigations including serum amylase, lipid profile and CT scan abdomen in order to diagnose acute pancreatitis. Relationship of age, gender, duration of diabetes mellitus and triglyceride levels was assessed with the presence of acute pancreatitis among the patients of diabetic ketoacidosis.

Results: A total of forty patients were managed as diabetic ketoacidosis in our hospital during the study period. Out of them 8 (20%) had acute pancreatitis while 32 (80%) were not diagnosed with acute pancreatitis. Confusion (55%) was the commonest presenting complaint followed by abdominal pain (25%). With binary logistic regression analysis, we found that female gender and raised triglyceride levels had a statistically significant relationship with presence of acute pancreatitis among the patients of diabetic ketoacidosis included in this study.

Conclusion: Considerable number of patients were diagnosed with acute pancreatitis who presented with diabetic ketoacidosis. Special attention should be paid towards female patients and those with raised triglyceride levels to look for the sign and symptoms of acute pancreatitis in order to diagnose and manage this condition.

Keywords: Acute pancreatitis, Diabetic ketoacidosis, Frequency.

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INTRODUCTION

All over the world, diabetes mellitus has been affecting the individuals of all age groups and ethnicities¹. It is a medical or to be more precise an endocrine disorder but it becomes multisystem due to its effect on almost all parts of the body/therefore sometimes it is not the usual presentation linked to glycemic control but it may present as a surgical or emergency issue which may in a lot of cases be life threatening^{2,3}. Adequate knowledge of all the consequences and phenomena related to this metabolic disorder can only let the treating physician to diagnose and manage early and effectively.

Pancreas has been an organ linked with a lot of endocrine and exocrine secretions and considered as one of the important glands of the human body⁴. Diabetes mellitus has also been directly linked to this gland as it produces insulin, which is the main chemical involved in glycemic control of human body especially fighting against all other hyperglycemic chemicals. Inflammation of this gland may lead to grave

consequences. Acute and chronic inflammation of pancreases present differently, and both have been linked with diabetes in one way or the other⁵.

Poorly controlled diabetes can present in number of ways. Sometimes it is just an incidental finding evident on routine laboratory test but sometimes it may present in a life-threatening condition like diabetic ketoacidosis which if not managed timely may lead to grave consequences like death of the individual⁶. Multiple other phenomena have been seen in patients of diabetic ketoacidosis as well which if not addressed may add insult to the preexisting injury⁷.

Patient with diabetic ketoacidosis may have pancreatic problem which may also have a temporal relationship with precipitation of ketoacidosis in a diabetic patient. Nair *et al* in 2000 concluded that DKA may mask coexisting acute pancreatitis in 10-15% of cases. Acute pancreatitis is more likely to be associated with a severe episode of DKA with marked acidosis and hyperglycemia. They did not establish any temporal association in their study but emphasized on the comorbidity of the two life threatening disorders⁸. Kim and Oh in 2016 reported a very interesting case of a young man who had acute pancreatitis when he presented

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with diabetic ketoacidosis, but he did not have hypertriglyceridemia⁹. Kumar *et al* from our neighboring country India reported a similar case but it had hypertriglyceridemia which has usually been linked with the comorbidity of DKA and acute pancreatitis¹⁰.

Limited local data available regarding this comorbidity in our set up. This lethal comorbidity can be life threatening for the patient and early diagnosis and management is the only key to reduce the mortality and morbidity. We therefore planned this study with the objective to determine the frequency of acute pancreatitis among the patients diagnosed with diabetic ketoacidosis at our tertiary care hospital.

METHODOLOGY

This correlational study was conducted at general medicine department of Pak Emirates military hospital Rawalpindi from June 2019 to December 2019. Sample size was calculated by WHO sample size calculator by using population prevalence proportion of 1.2%¹¹. Non probability Consecutive sampling technique was used to gather the sample. All patients between the age of 18 and 65 years who presented with diabetic ketoacidosis in the emergency department and seen and diagnosed by the consultant medical specialist were included in the study. Criteria for diagnosing diabetic ketoacidosis set by American diabetic association was used to diagnose diabetic ketoacidosis in this study^{12,13}. Exclusion criteria were the patients with less than eighteen years of age or those with any chronic illness other than diabetes mellitus. Patients who had history of gall stones were also not included. Immuno-compromised patients with cause other than diabetes, autoimmune disorder patients and patients on long term steroids were also not included. Pregnant ladies and illicit drug users were also not approached to participate in the study or were excluded at the first step. Patients with past or current history of obstructive jaundice or acute or chronic pancreatitis or any abdominal surgery or ERCP were also excluded from the study.

After ethics approval from the ethical review board committee and written informed consent from potential participants patients who were diagnosed with diabetic ketoacidosis at Pak Emirates Military Hospital Rawalpindi, fulfilling the above-mentioned inclusion and exclusion criteria were included in the study. They underwent routine laboratory investigations required in the patients of DKA. In addition to that serum amylase, lipase and lipid profile was performed in all the participants. All these investigations were performed from the laboratory of own hospital.

In addition to these laboratory investigations chest X-ray, Ultrasound abdomen and CT scan abdomen were also performed on all the participants of this study. Acute pancreatitis was diagnosed on the basis of Revised Atlanta Classification¹⁴. Relationship of age, gender, duration of diabetes and presence of hypertriglyceridemia was assessed with the presence of acute pancreatitis among the patients managed for diabetic ketoacidosis. A special proforma was designed for this study including the socio demographic profile and results of all the investigations carried out for this study.

All statistical analysis was performed by using the Statistics Package for Social Sciences version 24 (SPSS-24). Frequency and percentages for gender, patients with raised triglyceride levels and patients diagnosed with acute pancreatitis were calculated. Mean and standard deviation for age and duration of diabetes was also calculated for the study participants. First chi-square was applied and then binary logistic regression analysis was used to assess the extent of relationship of age, gender, duration of diabetes and presence of hypertriglyceridemia with the presence of acute pancreatitis among the patients of diabetic ketoacidosis.

RESULTS

A total of forty-eight patients were managed as diabetic ketoacidosis in our hospital during the study period but after the application of inclusion and exclusion criteria forty eligible patients were included in the study. Out of these forty patients, 29 (72.5%) were male

Table-I. Characteristics of patients presenting with diabetic ketoacidosis and suffering from acute pancreatitis (n=40).

Age (Years)	
Mean ± SD	38.17 ± 3.338
Range (min-max)	15-64 years
Gender	
Male	29 (72.5%)
Female	11 (27.5%)
Mean duration of diabetes mellitus	5.12 ± 3.355 years
Diagnosed with Acute Pancreatitis	
No	32 (80%)
Yes	08 (20%)
Presenting Complaints	
Confusion	22 (55%)
Abdominal pain	10 (25%)
Chest pain	06 (15%)
Shortness of breath	08 (20%)
Vomiting	11 (27.5%)
Others	02 (5%)

while 11 (27.5%) were female. Mean age of the study participants was 38.17 ± 3.338 years. Mean duration of diabetes was 5.12 ± 3.355 years. Out of them 8 (20%) had acute pancreatitis while 32 (80%) were not diagnosed with acute pancreatitis. Confusion (55%) was the commonest presenting complaint followed by abdominal pain (25%). Chest pain (15%) was least reported by the study participants (table-I). With binary logistic regression analysis, we found that female gender and raised triglyceride levels had a statistically significant relationship with presence of acute pancreatitis (p -value <0.05) while age and duration of diabetes mellitus had no such relationship (p -value >0.05) among the patients of diabetic ketoacidosis included in our study (table-II).

Table-II: The associated factors relating to patients presenting with diabetic ketoacidosis and suffering from acute pancreatitis: the binary logistic regression analysis.

	p -value	Odds ratio	Confidence Interval	
			Lower	Upper
Age				
Ref. is ≤ 40 years	0.805	0.769	0.095	6.225
Duration of Diabetes				
Ref. is ≤ 5 years)	0.387	2.646	2.92	23.953
Gender				
Ref. is Male	0.041	9.161	1.092	76.852
Triglyceride Level				
Ref. is <150 mg/dl	0.045	8.836	1.053	74.117

DISCUSSION

Acute pancreatitis is usually considered as a surgical emergency and has distinct presentation. In case of any comorbidity or presence of confusion presentation may not be very typical and difficult for the treating physician to diagnose. This increase the chances of missing a life-threatening condition even at tertiary care teaching units. Case reports of Kim *et al* and Kumar *et al* published in recent past are interesting and informative and sensitize the physicians to think out of the box and keep their level of suspiciousness high for picking acute pancreatitis in the patients of diabetic ketoacidosis^{9,10}. Diabetic ketoacidosis is a fairly common entity especially in the developing countries¹⁵. We therefore planned this study with the rationale to determine the frequency of acute pancreatitis among the patients diagnosed with diabetic ketoacidosis during the study period at our tertiary care hospital.

Simons-Linares *et al* did a large retrospective cohort study to look into this association more pre-

cisely and came up with the conclusion that patients with the triad of acute pancreatitis, diabetic ketoacidosis and hypertriglyceridemia have higher inpatient mortality, multi-organ failure, hospital charges, and longer hospital length of stay as compared to those which have any one of these conditions¹¹. A very interesting study done by Inayat *et al*. I important in this regard. They tried to manage the hyper triglyceridemic pancreatitis with insulin and generated positive results¹².

Zaher *et al* reported a case from Morocco which highlighted the role of DKA and hypertriglyceridemia in precipitating acute pancreatitis in a young patient¹⁶. This triad has been reported well in literature now in form of case reports, case series and cohort studies. We used prospective cross-sectional and analytical study design to look for presence of acute pancreatitis among patients of DKA and factors which were linked to this phenomenon. Eight (20%) of our study participants showed presence of acute pancreatitis according to the defined criteria. Nair *et al* showed results slightly lesser in frequency and 11% of their patients with DKA had acute pancreatitis at presentation. Difference might be due to the difference in study design or the setting or the difference in ethnicities of the target populations.

Simons-Linares *et al* in their famous 10 years long analysis published in 2019 concluded that when compared to Acute Pancreatitis-only, patients with acute pancreatitis and raised TG levels had lower mortality. The driving force for the increase in mortality of patients with the triad of acute pancreatitis, DKA and raised TG levels is the DKA rather than the raised TG levels¹¹. In this study we did not include mortality and morbidity as scope of our study or primary or secondary outcome but our results clearly showed that this comorbidity is not uncommon in our set up.

Lankisch *et al* and Shen *et al* had published that female gender has been significant associated with grave symptomatology of pancreatitis^{17,18}. Our results were interesting in this regard as well. Female gender emerged as a strong risk factor for presence of acute pancreatitis in patients of DKA. Though female proportion was far less than males in our study might be due to sampling from a military hospital but still there was a strong association of female gender with acute pancreatitis. More studies in public sector hospital may clear this association further.

Hypertriglyceridemia and acute pancreatitis have been discussed together in the past in various studies and it has been a documented fact that they are related

to each other. Rawla *et al* and Pretis *et al* in general population established this relation and discussed in detail and established that hyper triglyceridemic pancreatitis (HTGP) typically occurs in patients with an underlying dyslipidemia (such as type I, IV or V dyslipidemia) and in the presence of a secondary condition, such as inadequately controlled diabetes, excess alcohol consumption or medication use^{19,20}. These results also strengthened their findings and hypertriglyceridemia emerged as a strong risk factor to predict the presence of acute pancreatitis among the patients of DKA.

Less duration of study and small sample size were few limitations of our study. Multicenter prospective cohort studies may clear this phenomenon in better way and generate results that could be generalizable.

CONCLUSION

Considerable number of patients were diagnosed with acute pancreatitis who presented with diabetic ketoacidosis. Special attention should be paid towards female patients and those with raised triglyceride levels to look for the sign and symptoms of acute pancreatitis in order to diagnose and manage this condition.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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