Frequency of Diabetic Acidosis Among Adult Patients Presenting at a Tertiary Care Hospital

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ARTICLE INFO

ABSTRACT

Background: DKA, a severe diabetes complication, is increasing, especially in low-income nations like Pakistan. Quetta lacks data on its local impact. **Objective:** To determine DKA prevalence in Quetta adults, analyze clinical signs, risk factors, and demographics, improving local understanding of the condition. **Methods:** 230 adult patients (≥18 years) with a diagnosis of diabetic ketoacidosis participated in a descriptive, cross-sectional study at a tertiary care hospital. Purposive sampling was used to choose patients based on predetermined inclusion criteria. Clinical assessments and patient interviews were used to gather data, with an emphasis on sociodemographic information, diabetes history, risk factors, and current symptoms. **Results:** Most patients (61.8%) were between the ages of 31 and 60, and most of them were male (55.7%). 43.9% had experienced diabetes for more than five years, and a sizable percentage (73%) had Type 2 diabetes. Infections (28.7%) and poor medication compliance (42.6%) were the main causes of DKA. Remarkably, newly diagnosed diabetics accounted for 14.8% of cases. Polyuria (63.9%), polydipsia (57.4%), vomiting (45.2%), and abdominal discomfort (38.3%) were the most common presenting symptoms. In 24.3% and 21.3% of patients, respectively, severe symptoms such altered awareness and Kussmaul breathing were noted. **Conclusion:** According to the results, poor compliance and infections are the main causes of the alarmingly high prevalence of diabetic ketoacidosis among Type 2 diabetic people in their prime. To lessen the burden and severity of diabetic acidosis, the study emphasizes the necessity of better diabetes education, early diagnosis, and standardized care regimens in areas like Quetta.

INTRODUCTION

People without diabetes need to maintain their fasted blood sugar level between 80–99 mg/dL (milligrams per deciliter) after two hours without eating. People with diabetes suffer from blood sugar regulation failure as a medical problem that generates high as well as dangerously high blood sugar levels. The breakdown of insulin reaction processes within the body produces this medical condition according to Farsani SF et al. (2017).

Diabetes mellitus (DM) functions as the dominant metabolic disease which affects people globally during present times. Medical records from 1985 to 2000 show an increase in the total number of DM cases worldwide which grew from 30 million to 177 million. Authentic data demonstrates diabetes will become a health problem affecting more than 360 million individuals during the upcoming twenty years. According to the Centers for Disease Control and Prevention (2005) 7% of Americans made up 20.8 million diabetics within the total population. About one-third of patients who had the illness did not receive an official diagnosis of it.

People with diabetes need to control their disease persistence because diabetes is a condition which persists throughout their entire life. The diabetic population experiences a combination of tiny vessel diseases in addition to large vessel diseases.

The 26.3% diabetic Pakistani population received medical diagnosis from 19.2% and sole diagnosis from 7.1% based on (Basit A et al., 2018).

Acute diabetes complications become responsible for 40% of deaths among people over 50 years old but younger individuals only experience 3% of related deaths (Rosenthal MJ et al., 1998). The worldwide prevalence of children suffering from diabetic ketoacidosis rose by 3% annually starting from 1980 making this the most typical diabetes condition affecting

pediatric patients (Farsani SF et al., 2015). Diabetic ketoacidosis patients exhibit entire metabolic acidosis qualities because they present with hyperglycemia and hyperketonemia together with the acidosis symptoms. The regular appearance of DKA occurs in type 2 diabetes mellitus patients since their numbers continue to grow by 4–9.

The study performed at King Abdul-Aziz University Hospital in Jeddah, Kingdom of Saudi Arabia discovered that infection and poor compliance each contributed 28% and 54.4% respectively to DKA case numbers (Qari FA 2003). During the analysis period at Grand Memorial Hospital in Atlanta in 2004 they documented 56 diabetic ketoacidosis (DKA) patients yet diagnosed diabetes affected 75% of those cases (Moore SR et al., 2004).

Healthcare providers diagnose this condition as hyperglycemic hyperosmolar state when hyperosmolarity combines with severe hyperglycemia that produces severe dehydration, but no ketosis occurs (McNaughton CD et al., 2011).

Files show that diabetic individuals under intensive treatment plans receive both insulin and triple therapy face threefold increased hypoglycemic risks. Patient hospital duration decreases, and their risk of dementia develops after experiencing severe hypoglycemia in diabetic management (Umpierrez G et al., 2016). The end result becomes a higher mortality rate for diabetic persons undergoing hospital emergency treatments for hypoglycemia (Rajendran R et al., 2015).

A total of 5 million patients succumb to diabetes complications yearly within developing nations and Pakistan experiences diabetes prevalence rates reaching 28.3% in urban populations and 25.3% in rural populations (Basit A et al., 2017). The research conducted by Shahid W et al in 2014 demonstrated that patients who neglected their medication regime made frequent visits to emergency departments because of their treatment complications. Research evidence demonstrates that diabetic patients take their medications less frequently than patients from other healthcare groups.

The condition known as DKA presents a dangerous acute medical emergency that develops because of diabetes mellitus (Shahid W et al., 2020). Research conducted by the American Diabetes Association (2004) established that DKA patients have a fatality risk below 5% percent. During 1985 to 2002 WANG J et al. (2006) observed a 4.2% downward trend in United States annual mortality counts. Patients with DKA commonly succumb to the primary fatal conditions of myocardial infarction as well as sepsis (BASU A et al., 1993).

LITERATURE REVIEW

The most dangerous form of complication of DM with lack of easy access to healthcare is DKA in the acute form. This can occur in individuals with type 1 diabetes, but also in people with type 2 diabetes, especially from disadvantaged socioeconomic groups, in particular in cases of delayed diagnosis [Wolfsdorf et al 2018], although this term is particularly linked to type 1 diabetes, according to new research [Wolfsdorf et al 2018], it is increasingly becoming the case of type 2 type of diabetes. DKA is usually due to absolute or relative lack of insulin to activate it such as in CPH, rise of action of counter regulating hormone, the formation of ketone bodies metabolic acidosis (Kitabchi et al. 2009).

Differentials in DKA prevalence were found for regional and health infrastructure, and population awareness. According to a multi-center study conducted in India, about 22.4 per cent of the total patients diagnosed with diabetes were admitted to the ER of a multi-center Indian hospital and all of whom were associated with DKA (Kalra et al., 2013). The implication is that late diagnosis, lack of glycemic control and almost all follow up of patients by the healthcare is due to a large disease burden in LMIC.

These dictates of common diabetic patients of Pakistan are admitted Emergency hospitalization for (DKA). In our retrospective study done in Aga Khan University hospital, we found that out of 31.6% patients with DKA had a second DKA episode to infection, diabetes education failure and failure of insulin therapy (Riaz et al 2014). This finding is consistent with global trends of new infection onset, diabetes, medication nonadherence, among other, observed by Umpierrez et al. (2002).

Patients need such treatment and timely diagnosis of DKA as they will spend longer in the hospital and have higher rates of mortality. Simultaneous prospective cohort research in Ethiopia has revealed that the death rate for patients with DKA was 4.8% and mean of hospital stay 6.7 ± 2.2 days. These were most of the time just secondary to the degree of severity of acidosis at admission and late presentation (Gebremichael et al., and 2015). These findings highlight our requirement to time and aggressiveness of treatment of DKA to prevent morbidity and mortality.

Biochemical markers of DKA include hyperglycemia (> 250 mg/dL), hypokalemia (< 5.0 mEq/L), hypomagnesemia (< 2.0 mEq/L), hypocalcemia (< 8.0 mg/dL), hypoalbuminemia (< 18 mEq/L), raised anion gap, disassociation of ketonemia and ketonuria (Wolfsdorf et al. 2018). But in resource poor laboratories as well as community-based settings, most diagnostic delays are usual due to lack of laboratory facilities as well as point of care testing. The clinical expertise and the fundamental standards of the diagnosis have shown a timely response in those situations present in the study of Sudanese (Elhadd et al. 2011).

Development of DKA has been considered in the past couple of years regarding its influence on comorbid diseases and age. Most children are dehydrated and electrolyte imbalanced more than adult patients, between dehydration and electrolyte imbalances. In addition, diseases of the coronary vascular system and age (Benoit et al., 2018) make DKA much more difficult to treat in the adult. But chronic disease screening is not a common occurrence in LMICs like Pakistan, and people with unsuspected diabetes develop advanced sequelae with DKA everywhere.

Additionally, gender was associated with outcomes of DKA. Such patients are also known to have greater sociocultural factors and have a higher chance of being admitted in DKA again at the hospital (Ali et al., 2017). To make the element of access to diabetes care possible, these elements have to be resolved through the gender responsive policy change and education.

In the past 20 years, it has happened greatly in the tendency and the management of DKA. In fact, although it is basically insulin therapy with fluid replacement, it has become important to correct the potassium (Chiasson et al. 2003), and the monitoring of its metabolic parameters. The American Diabetes Association (2022) can standardize regimen, which can prevent any of the results to happen, such as cerebral oedema and hypokalemia by checking the levels of regular glucose and electrolyte.

It has nothing to do with number of staff but the number of staff relative to the amount of diagnostic and treatment resources that the local hospital cannot provide in line with the international standards. In a study conducted in 2016 in the Lahore audit by Yousaf et al., out of various tertiary care hospitals, it was found that in many hospitals, DKA was not being treated in the way of protocol was viewed as being done and the outcomes were many.

Did to prevent the incidence of DBKA up to their events such as diabetes education, blood glucose self-monitoring and the early symptoms detection. Internationally, 'Structured diabetic self-management education programs reduce glucose control as much as from several fold to the lowest in DKA admissions as 45%' (Powers et al). However, there are no such programs run in Pakistan in the reserved or rural areas out of which Quetta acts as an example have been localized as process.

RESEARCH OBJECTIVE

This study attempts to find out the amount of diabetic acidosis patients among adult patients admitted in a tertiary care center Quetta. The aim of this study is to find out the proportion of patients achieved this study as it signifies the prevalence of patients with diabetic acidosis in the community. I will base the finding on

prevalence and maybe risk factors for this severe diabetic consequence. In addition, it aims to provide evidence in a manner which can be useful to the policy makers and medical physicians in formulating sound policy by predicting early identification, early intervention and good medical handling of diabetic acidosis.

METHODOLOGY

This is a cross sectional, qualitative and descriptive study using this to discover prevalence and determinants of diabetic acidosis of Indian adult patients attending tertiary care hospital Quetta. The study is a purposive sample of 230 respondents that are aged 18 years or above with a clinical diagnosis of diabetic acidosis, either give themselves to hospital or being hospitalized with a previous diagnosis of diabetic acidosis. This was a specific sampling technique under the inclusion criteria which comprised only of the adults having the confirmed DKA diagnosis who are able to give the verbal agreement. Also excluded were patients with acidosis of non-diabetic origin and children younger than 18 years of age, which could not participate in the interview.

RESULTS
Table 1
Socio-Demographic Characteristics of Patients (n = 230)

Characteristic	Frequency (n)	Percentage (%)
Age Group (years)		
18–30	52	22.6%
31–45	74	32.2%
46–60	68	29.6%
61 and above	36	15.6%
Gender		
Male	128	55.7%
Female	102	44.3%

Figure 1
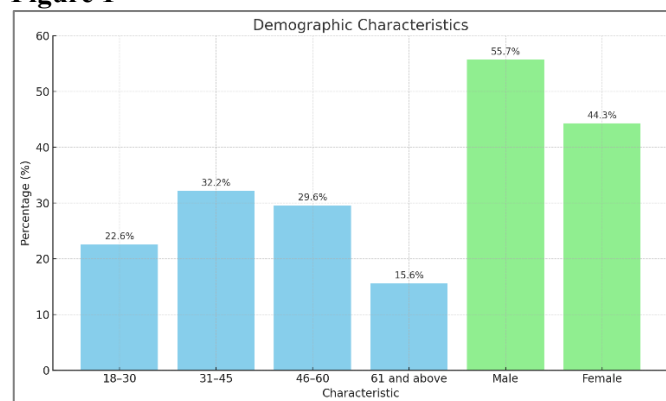
Table 2
Clinical Profile of Diabetic Acidosis Patients

| Clinical Variable	Frequency (n)	Percentage (%)
Type of Diabetes		
Type 1 Diabetes	62	27.0%
Type 2 Diabetes	168	73.0%
Duration of Diabetes		
< 1 year	38	16.5%

1–5 years	91	39.6%
> 5 years	101	43.9%

Table 3

Precipitating Factors of Diabetic Acidosis (n = 230)

Precipitating Factor	Frequency (n)	Percentage (%)
Infection	66	28.7%
Poor compliance to medication	98	42.6%
Newly diagnosed diabetes	34	14.8%
Emotional/physical stress	18	7.8%
Unknown/idiopathic	14	6.1%

Table 4

Presenting Symptoms of Patients with Diabetic Acidosis (n = 230)

Symptoms	Frequency (n)	Percentage (%)
Polyuria (frequent urination)	147	63.9%
Polydipsia (excessive thirst)	132	57.4%
Abdominal pain	88	38.3%
Vomiting	104	45.2%
Altered level of consciousness	56	24.3%
Kussmaul breathing	49	21.3%

Figure 2

Symptoms Reported by Patients
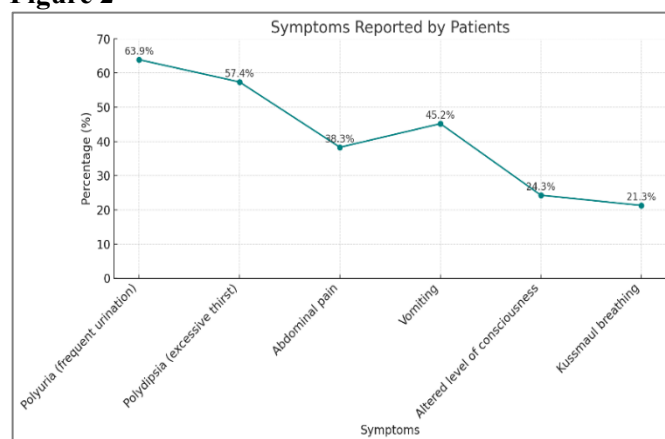
DISCUSSION OF THE RESULTS

The purpose was to find out the epidemiology of diabetic acidosis in adult patients having tertiary care at Quetta Hospital and clinical graphic Epidemiological, precipitating factors and the common symptoms of these patients with this condition. Furthermore, it tends to appear in patients with diabetic acidosis in patients 31 to 45 years (32.2 %) and 46 to 60 years (29.6 %). Here, the first is this: that this is the group that suffers most of all when they are in their productive age, which is said to be people of diabetic acidosis with consequences for labor productivity and population health. But there were totally 55.7% of cases that were male, slightly more in males. This regional research indicated that other behavioral and health care access factors were such that it was more likely to be poor disease management or late diabetes diagnosis in case of male patients.

Finally, Table 2 then enquires at how much believed (remain) that DKA is essentially a type 1 Diabetes, since 73% of DKA patients in this study had type 2 Diabetes. According with several global findings, the incidence of DKA among adults with Type II diabetes has been found to be increasing in adults, and especially in low- and middle-income countries (LMICs) where, barriers to health care accessibility, poor glycemic control and delayed diagnosis are common. In addition, diabetes lasts more than five years in 43.9 per cent of hearers, who need diabetes education and care, to prevent such complications as DKA.

Table three suggests that patient not follow his treatment was more than half of the precipitating causes of diabetic acidosis (42.6 %) as well as infection (28.7 percent). Studies on the existence of DKA episodes leading causes such as intercurrent infection and not adherence to DKA regimens; this paper revealed 10 % of all children who had DKA at the Hospital also had Kilsi (RCM) shock before DKA. But this is concerning as out of the 14. eight per cent patients said to suffer from DKA they had not been earlier screened and diagnosed there as such in an underprivileged place such as Quetta. Though 6.1% of causes of DKA were known causes and only 7.8% of causes of DKA, this was enough to show that there were a great variety of causes of DKA.

Of the symptoms, polyuria (63.9%) and polydipsia (57.4%) were the most classical features of hyperglycemia and most common as shown by Table 4. Also, common complaints of diabetic acidosis such as vomiting (45.2 percent) and stomach distress (38.3 percent), are from ketone accumulation and dehydration. Of these patients, 24.3% had advanced or worse clinical features (unconsciousness, 21.3% Kussmaul breathing) and these represented the advanced or severe DKA patients. These results suggest that the only way to prevent such fatal complications is by getting patients and their primary care physicians to become aware of such symptoms and are able to detect them prior to their becoming dangerous.

CONCLUSION

Critically an exhaustive documentation was made of diabetic acidosis in patients above age 18 years in Qudrat Shah hospital of Quetta against frequency, demographic preponderance of patients, clinical presentation and factors responsible for the complication. Very much diabetic acidosis happens in percentage among the productive age groups (31 - 60 years) and with the high percentage of males 55.7 %. This may be a gender disparity or difference on how the disease is being treated, access to care or health behavior seeking.

However, in this study, we actually demonstrated that 27 percent among the population with DKA and type 2 diabetes also had DKA who were not part of the

conventional link of DKA associated with type 1 diabetes. In LMIC, paucity of education, poor glycaemia control and less availability of health care may relate to current frequency of DKA among type 2 diabetics. In addition, the study reveals that there is a merger of patients with diabetes of more than five years duration (42.9%) and therefore, reminders are produced to ensure verity of being in the patient supervise and disease control to maintain the complications.

Due to the principal causes in this study of the diabetic acidosis being regional as well as international research findings; namely infection (28.7%) and poor medication compliance (42.6%) from both the regional and international research. Along with these, 14.8 % of all the newly diagnosed patients with diabetes had the only DKA as first clinical presentation, which shows the importance of adopting the measures, particularly in the poor areas, for their screening and early diagnostic programmed on a sound basis.

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