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Short Communication

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Impact of Diabetic Ketoacidosis on Pregnancy Outcome at Al jala Hospital

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ABSTRACT

Diabetic ketoacidosis (DKA) in pregnancy is a serious complication that poses several challenges with respect to diagnosis, management and prevention.

Aim: To identify maternal and neonatal outcomes in patients with history of diabetic ketoacidosis during the pregnancy.

This study was a case series study. It was carried out in diabetic pregnancy unit, Al jala maternity hospital from 1st of January 2010 to 31st of January 2017. Twenty-six diabetic pregnant women with history of DKA during period of study were included. Data was collected in a preformed work sheet including patient`s age, parity, abortion, type of diabetes, duration of diabetes, gestational age at booking and at DKA time, laboratory results, precipitating factors of DKA, mode of delivery and neonatal outcome.

The mean age for DKA patients was 35±6.2 years. Most of affected patients were para 1-3, the majority of patients had type I diabetes and they were on insulin therapy with mean duration of 9 years, the mean blood glucose level was 356 mg/dl, the mean PH was 7.21, the mean HbA1c was 8.3%, and the mean bicarbonate level was 6.1 meq/L. Emesis was the main precipitating factor followed by urinary tract infection(UTI) and steroid administration, 42.3% of affected patients delivered by cesarean section (C/S) and no maternal mortality was recorded. Regarding fetal outcomes, 34.6% had abortion, 42.3% were low birth weight, and only 7.7% were large babies, intra uterine fetal death (IUFD) recorded in about 30.8% of the cases.

While the outcomes of diabetic ketoacidosis in pregnancy have improved over years, DKA remains an important cause of maternal morbidity and fetal loss in diabetic pregnancy. Prevention, early recognition and hospitalization, and aggressive intensive care unit management remain the cornerstones to minimize the adverse outcomes of this dreaded complication.

Keywords- *Ketoacidosis; Diabetes mellitus; Pregnancy.*

INTRODUCTION

Diabetic ketoacidosis is a serious complication of diabetes often resulting in a medical emergency. Fortunately, the occurrence of DKA in women with diabetes who become pregnant is rare (0.5–3%).[1,2] It was usually occurs in patients with type 1 diabetes mellitus especially with new-onset type 1 diabetes, but it may also affect women with type 2 diabetes or, more rarely, women with gestational diabetes(GDM).[1–6] DKA is rarely life threatening to the pregnant woman if it is recognized and treated promptly. The risk of maternal mortality secondary to complications from DKA is not well established. However, fetal loss rates remain in the order of 10-25% for a single episode of DKA despite substantial improvements in perinatal and neonatal care.[7] Pregnant women are at a greater risk for DKA than are non- pregnant diabetic women.[8] Factors that predispose the pregnant patient to DKA include accelerated starvation, dehydration, decreased caloric intake, stress, and increased production of insulin antagonists.[9] The most common precipitating risk factors for development of DKA are infection-related acute illness in 30%, and failure to take insulin as prescribed in 30%.[10] Other, less common reasons include insulin pump failure or concurrent use of medications as steroids, β-adrenergic medications.[2]

The exact mechanisms by which maternal DKA threatens fetal well-being are not fully understood and the published literature in this area is sparse.

It is known that the ketoacids as well as glucose readily cross the placental barrier. Several pathophysiologic aspects of DKA probably contribute to fetal loss. Whether it is the maternal acidosis, hyperglycemia, severe dehydration (resulting in decreased utero-placental perfusion), or electrolyte imbalances that has the most harmful effect on the fetus is unclear. Information regarding fetal status during correction of DKA is based on several case reports demonstrating fetal heart rate tracings that are concerning for fetal distress and on animal models of DKA.[11, 12]

The current study was conducted to investigate the maternal and fetal outcomes among diabetic pregnant women who have an episode of diabetic ketoacidosis, who were admitted to Al jala Maternity Hospital.

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MATERIALS AND METHODS

This study was retrospective case series study. It was onducted in diabetic pregnancy unit (DPU), Al jala Maternity Hospital, Tripoli- Libya, from first day January 2010 to 31, January 2017. Twenty-six diabetic pregnant women with history of DKA were included. Data was collected in a preformed work sheet including: age, parity, history of abortion, type of diabetes, duration of diabetes, gestational age at booking and at DKA time, laboratory results, precipitating factors, mode of delivery and neonatal outcome.

Statistical analysis was computerized using the Statistical Program for Social Sciences (SPSS version 21). Descriptive statistics were used and all results are presented as frequencies, and percentages.

RESULTS

Out of 3261diabetic pregnant women who had delivered at Al jala Maternity Hospital over the study period, 26 of them (0.8%) had DKA. The mean age for the patients was (35 ± 6.2 years). The maximum age was 44 years and the minimum was 22 years. Furthermore, majority of them had type 1 diabetes (84.6%), and 38.5% of participants had diabetes for more than 10 years. 57.7% of the patients had the booking visit in the 1st trimester, however, only 15.4% had DKA in the 1st trimester, and the remainders were in both the 2nd trimester and the 3rd trimester, most of them were between para 1 and para 3 (61.6%) (Table 1).

Table 1: Socio-demographic and clinical characteristics of participants in Aljala maternity hospital

	No.	%
Age:		
21-30	5	(19.2%)
31-40	15	(57.7%)
>40	6	(23.1%)
Type of DM:		
GDM	3	(11.5%)
T1DM	22	(84.6%)
T2DM	1	(3.8%)
Duration of DM:		
1-5	8	(30.8%)
5-10	8	(30.8%)
>10	10	(38.5%)
Gestational age at DKA:		
1st trimester	4	(15.4%)
2nd trimester	10	(38.5%)
3rd trimester	12	(46.1%)
Parity:		
Nulli para	8	(30.8%)
1-3	16	(61.6%)
4-6	1	(3.8%)
>6	1	(3.8%)

The glucose level was between184–582 mg/dl (the mean 356 ± 102 mg/dl), PH level was ranged between 6.9-7.34 (the mean7.21 ± 0.13) and HbA1c mean was 8.3 ± 1.9 (Table 2).

Table 2: Laboratory investigations of the study participants at Aljala maternity hospital

Lab result	Mean ± SD	Range
Glucose	356 ± 102	184 – 582
PH	7.21 ± 0.13	6.9 – 7.34
Bicarbonate	6.11 ± 3.7	2 – 18
HbA1c	8.3 ± 1.9	5.6 – 13.8

The major precipitating factors of DKA were emesis (34.6%), emesis and UTI (26.9%), infection corticosteroid administration contributed by 11.5% for each (Figure 1).

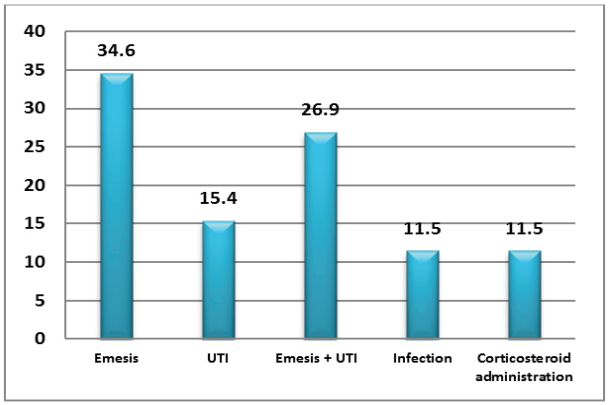

Figure 1: Precipitating factors of DKA among study participants , Aljala maternity hospital

Majority of patients 42.3% delivered by C/S, 34.6% had abortion and 23.1% had normal vaginal delivery. About 30.8% of the patients had IUFD and 69.2% had alive fetus.

The study showed that, 42.3% were low-birth weight (< 2.5kg), 50% had normal weight (2.5- 4kg) and only 7.7% were large babies (>4kg) (Figure 4).

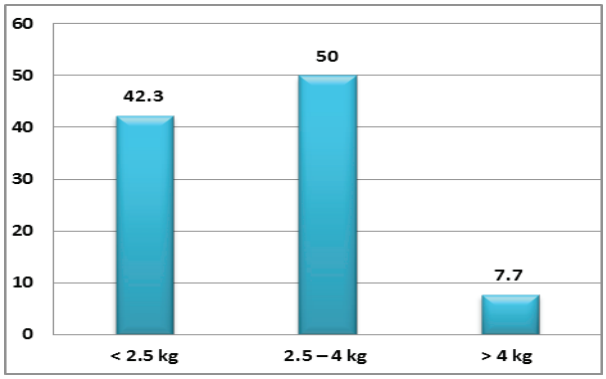

Figure 2: Birth weight of babies of diabetic ketoacidosis patients

DISCUSSION

The occurrence of diabetic ketoacidosis in pregnancy compromises both fetus and mother. It is usually occurs in the later stages of pregnancy and seen in newly presenting type1 diabetes patients. Despite improvement in its incidence rates and outcomes over the years, it remains a major clinical problem since it tends to occur at lower blood glucose levels and more rapidly than in non-pregnant patients often causing delay in the diagnosis.[13] The management of pregnant patient with DKA is particularly challenging since the health care team is caring for two patients (mother and fetus). While it is recognized that maternal well-being and fetal well-being are both of critical importance, it is important to remember that until maternal status has been stabilized, her well-being should take precedence over her child's. The clinician charged with the management of this potentially life-threatening complication in pregnancy should avoid temptation to intervene with a cesarean delivery for fetal indications until maternal status has been stabilized. The ultimate goal is to ensure a healthy pregnancy outcome for both the mother and fetus.[14] Because it is not common to see DKA pregnant women, there were few studies on the DKA in pregnancy. The current study showed that the mean age for the DKA patients was 35±6.2 years. The age ranged between 22 and 44 years with most of the women between 31 and 40 years. The result of Montoro MN et al[7] showed that the mean age of DKA patients was 25±4.8 years which were lower than the current study result. The result of Schneider MB et al showed that the mean age of DKA patients was 27±1 years.[15] Kilvert JA et al also reported that the mean age of the patients was 27.4 years.[16] With regard to the type of diabetes, the study showed that the majority of the patients had type 1 diabetes and they were on insulin therapy with mean duration of 9 years. Most of the studies showed that type 1 diabetes was the predominant type in DKA patients.[13-15]

Regarding the investigation results, this study reported the following; the mean blood glucose level was 356 mg/dl, the mean of PH was 7.21 and the mean of bicarbonate was 6meq/l. Nearly similar result was reported by Schneider MB et al in which that the mean blood glucose: 377 ± 27 mg/dl, pH: 7.22 ± 0.01, bicarbonate 7.9 ± 3 meq/l, and positive serum ketones.[15]

The result of Montoro MN et al study showed the following; the mean blood glucose 374 ± 100, PH 7.23 ± 0.08 and bicarbonate 7 ± 2.3[13], Kilvert JA et al reported the following; the mean PH was 7.16 and bicarbonate was 8.3 [16], both of these studies' findings are not different from this study finding.

Regarding the precipitating factors, the result showed that emesis was the main precipitating factor followed by UTI. Schneider MB et al reported that infection (27%) and a history of the omission of insulin therapy (18%) were the most common precipitating causes for DKA.[15]

Schneider MB et al reported that only 27% of the DKA patients ended with abortion or fetal death[15], also, Kilvert JA et al reported that the overall fetal loss including spontaneous abortion was 22%[16], these two study finding are opposite to current study finding in which the fetal loss was reported in more than 30% of the cases.

CONCLUSION

DKA remains an important cause of fetal loss in diabetic pregnancies. While the outcomes of diabetic ketoacidosis in pregnancy have improved over the years, significant maternal morbidity and fetal mortality remains.

RECOMMENDATIONS

Prevention, early recognition and hospitalization, and aggressive management remain the cornerstones to minimize the outcomes of this dreaded complication.

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