Case Report

Rapidly Controlled Diabetes Mellitus: A Six-Month Experience with the Ramadan Fasting Effect

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Abstract

This is a brief case reporting a type-II diabetic patient with poor glycemic control that improved after diet/lifestyle change, coinciding with fasting during Ramadan.

A 47-year-old patient presented with severe polyurea, polydipsia, vision disturbances, and sudden weight loss of 10 kg. The initial check showed a high random glucose level (514 mg/dL) that was confirmed with a high HbA1c (17 mmol/L), but without any hyperosmolar nonketotic diabetic coma (HHNC) and with a remarkable visual deterioration. The patient underwent immediate medical intervention by administering metformin (500 mg/BID). The patient underwent complete pharmacotherapy in conjunction with diet control and lifestyle change during and after the Ramadan month.

After one month, all the hyperglycemic symptoms subsided significantly, even the visual complaints. Rapid reduction of the estimated glucose level (HbA1c, from 17.63 to 5.8) in six months was reported, returning to normal vision level, and body weight was restored (77.6 – 82 Kg).

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Introduction

Type II diabetes millets with poor glycemic control may lead to a serious life-threatening metabolic emergency condition such as Hyperosmolar nonketotic diabetic coma (HHNC), also known as Hyperosmolar Hyperglycaemic State (HHS), which is a syndrome of acute decompensation of diabetes mellitus, occurring mainly in the elderly and characterised by marked hyperglycemia, hyperosmolarity, severe dehydration, occasional neurological signs, obtunded sensorium, and absence of ketonemia or acidosis. HHNC is one of two serious life-threatening metabolic emergency conditions where a blood glucose level above 250 mg/dL is enough to diagnose it.[1] It is considered a volume-depleted state with a total body water deficit of approximately 12% to 15% of body weight.[2]

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Rapid control of highly reported HbA1c type II diabetes mellitus is relatively rare, using low-dose metformin monotherapy within a very short timeframe of six months, including an intermittent fasting model (Ramadan). Furthermore, an improvement of the far vision (-1, myopia) disturbance after starting treatment for one month was reported, but the affected near vision (+1, hypermetropia: presbyopia) rapidly returned to normal vision, although it was associated with age (>40). All these events were of great interest to healthcare providers.

This brief case was set out to report a personal experience of rapidly controlled type II diabetes mellitus with poor glycemic control after diet/lifestyle change coinciding with fasting during Ramadan to prevent the occurrence of Hyperosmolar coma. Only clinical symptoms and glucose level monitoring were used in the initial diagnosis assessment and for the management planning and monitoring of therapy.

Case Report

A.A. is a 47-year-old Sudanese university professor. On 27 February 2023, he was diagnosed with type II DM after observing clear 3-Polys (Polyurea, polydipsia & polyphagia) for more than 1 month. The patient presented to the Al-Aqiq primary healthcare center with repeated onset of polyurea, polydipsia, visual disturbances (newly wearing eye-glasses for vision correction, see Fig. 1), and significant weight loss. The patient's medical history was not notable for diabetes mellitus, without a family history. He was not on any other regular medications and had no known drug allergies. It was noted that he was neither a smoker nor engaged in regular exercise.

Initial examinations revealed that his Body weight was 77.6 kg, BP was 138/89, pulse was 88 beats/min, and normal eye condition, although he complained of near vision problems.

On arrival at the medical center, the patient had a random glucose level reported of 518 mg/dl after further investigations (HbA1c = 11.7 NGSP, ketone urea = + and sugar urea = ++) detected in **his** blood sample. This required an urgent medical intervention and baseline reporting.

Although he looks little bit obese, he does not report any resistance to insulin. The patient is not suffering from fever or infective symptoms at time of presentation, and he does not report any other endocrine disease.

Blood tests on admission showed an increased random (518 mg/dL) and cumulative (17.63 mmol/L) glucose level. The initial blood baseline profile for newly diagnosed DM type II was performed the next day in a fasting state of 12 hours and showed normal liver, kidney functions and a slight increase in lipid profile.

The patient was directly infusion with normal 400 ml saline for 30 min. (reduction in the rapid blood glucose test = 400 g/dl), the patient was discharged immediately after this short stay admission. A one-month treatment plan with Metformin 500 / BID and vitamin B complex was initiated once a day with dietary control and exercise advice and monitoring of self-blood glucose levels on a daily basis.

The first decision was taken immediately after evaluating the HbA1c result, which showed a very high value of 17 while the expected values ranged (4.1 – 5.9) at presentation. The diagnosis of the case became clear following this confirmatory test.

Figure 1: *Short stay after diagnosis and administration of normal saline I.V. to avoid any risk of developing hyperosmolar non-ketotic diabetic coma by reducing the random glucose level from 514 to 400 mg/dL.*

Table 1: *Regular follow-up of newly diagnosed diabetic patients from the start point until the seventh month after. It showed various measures, interventions through the predefined time framework of management.*

Date/time	Measure of control	Fasting/mg/dL	Random/mg/dL	Intervention	Remarks
28-Feb	At point of diagnosis	-	514	Newly diagnosed	Short stay
	After 30 min	-	400	NS I.V 400 ml for 30 min	Discharge
4th march	After 5 days	-	346	Metformin 500 BID	No exercise.

After identifying the exact diagnosis, the second challenge became finding the primary cause of the newly diagnosed disease. Differential factors included constructing the baseline profile and investigating any hereditary factor(s) involved. The finding of complete blood profile along with other investigations is consistent with a metabolic and lifestyle being the primary cause. Thus, changing the lifestyle and controlling the diet may return the normal situation.

Following diagnosis on the first day of admission, the patient underwent urgent medical intervention to prevent hyperosmolar edema or other complications. This served as an important therapeutic goal and was aimed at rapid control of the very high blood glucose level (Figure 1).

The patient was initially given metformin 500 mg/BID and vitamin B complex to overcome and metformin side effects. Following the advice of the consultant, the patient received 20 mg of atorvastatin / BID due to a slight elevation in the lipid profile to prevent any cardiovascular complications.

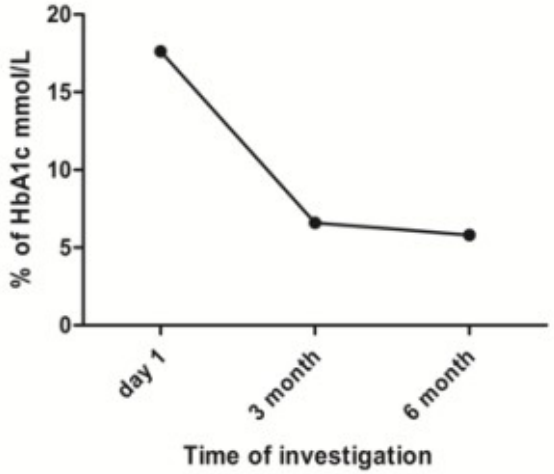

Figure 2: *HbA1c level from the point of diagnosis and after 3 and 6 months.*

Finally, the decision was made to discharge the patient and to provide advice on diet control and possible lifestyle changes with regular glucose level monitoring.

The patient's lifestyle change includes regular exercise of a walking distance of 5-7 km daily, completely stop white sugar intake and use natural sweeteners (Stevia), stop having dinner, and only drink tea with milk after sunset.

Following medical therapy, lifestyle changes, and diet control, a slight transient improvement in the diabetic state was reported. This includes the absence of all clinical symptoms and a return of normal sight; unfortunately, the patient did not gain weight. Furthermore, follow-up monitoring of HbA1c after 3 months indicated a significant reduction (from 17 – 6.6) indicating a good and rapid prognosis. Based on the results of the HbA1c and fasting test, it was believed inconceivable that the patient would make a recovery without changing the drug or dose, but by continuing the diet control and lifestyle change. It was considered more probable that the patient would be treated significantly. Therefore, the treatment was continued, and the results are shown in Table 1 & Figure 2).

Upon rigorous follow-up, the patient showed rapid control, and a good prognosis appeared as he gained his previous body weight, returned to his normal insight, and ceased to wear eyeglasses.

Discussion

Reporting a personal experience was of great interest, especially if the case has very strange, dramatic characteristics that start with the appearance of symptoms, progress through a very strange diagnosis, and end up with rapid control with simple measures. Hyperosmolar coma is relatively common and has high mortality.[3] It accounts for only 13% of hyperglycaemia-related emergency admissions.[4]

Table 2: *Regular follow-up of newly diagnosed diabetic patients from the start point until the seventh month after. It showed various measures, interventions through the predefined time framework of management.*

Date/time	Measure of control	Fasting/mg/dL	Random/mg/dL	Intervention	Remarks
9th march	After 10 days	104	311	Metformin 500 TID + light exercise	light exercise
14th march	After 15 days	129	190	Metformin 500 mg TID + Intermediate exercise	Intermediate exercise
March 19,	After 20 days	-	143		
26-Mar	Start of Ramadan	108 (measure just before breakfast at (5 p. m.) after more than 14 hours of fasting.	-	1000 + 500 mg BID + no exercise	Change in lifestyle (No exercise)
29-Mar	3-Next days	111	175		
3-Apr		100	275	1000 + 500 mg BID + no exercise	Change in lifestyle (No exercise)
4-Apr	The next day	-	160		
6-Apr		100	-		
11-Apr		99	-		
13-Apr		104	-	Metformin 500 BID	No exercise.
17-Apr		110	-		
20-Apr	End of Ramadan	107	-		End of Ramadan
26-Apr		112	-	Metformin 500 BID	No exercise.
1-May		124	-		
3-May		115	-		
8-May		121	-		
18-May		102	-		
25-May		107	-		
2-Jun		104	-	Metformin 500 BID	Regular heavy exercise
7-Jun		112	-		
11-Jun		112	-		
19-Jun		83	-		
22-Jun		89	-	Metformin 500 BID	Regular heavy exercise
26-Jun		95	-		
3-Jul		101	-	Metformin 500 BID	Regular heavy exercise
10-Jun		86	-		
16-Jun		86	-		
22-Jun		108	-		
27-Jun		90	-		
1-Aug		99	-	Metformin 500 BID	Regular heavy exercise
6-Aug		106	-		
14-Aug		106	-		
18-Aug		92	-		
25-Aug		119	-		
30-Aug		100	-		
3-Sep		99	-	Metformin 500 BID	Regular heavy exercise
8-Sep		93	-		
15-Sep		87	-		
22-Sep		103	-		
29-Sep		107	105		

Hyperosmolar nonketotic diabetic coma (HHNC) is a syndrome of acute decompensation of diabetes mellitus. HHNC is one of two serious life-threatening metabolic emergency conditions.[4] There is often a critical delay in establishing the diagnosis and initiating therapy, due to its misleading clinical presentation.[5] Cerebral oedema is a serious and usually fatal complication of the treatment of diabetes. These complications should be avoided by adequate replacement, and especially by regular clinical and laboratory monitoring.[3] By educating of all diabetic patients and physicians to detect metabolic decompensation early.[6]

Early diagnosis and rapid management are fundamental to ensure a good prognosis and prevent complications.[7]

Rapid diagnosis is crucial for the management of diabetes mellitus.[8] The primary health care physician helps reduce complications and provide a better quality of life for diabetes patients.[9] Physical activity remains a critical component of the treatment for patients with established diabetes.[10] Metformin is still the first line in the type 2 diabetes management algorithm.[11] Metformin represents the gold standard in type 2 diabetes.[12]

Conclusion

DM with a high HbA1c and a random glucose level without hyperosmolar non-ketotic diabetic coma (HHNC) is a rare condition. Early detection of the primary cause of the newly diagnosed diabetic patient is paramount to determining the clinical outcome of the patient. Diet control and lifestyle should be checked and used to manage DM with no known family history, while only Metformin is enough to treat this condition. Initial clinical examinations and laboratory investigations may be enough in the setting of DM care.

An adequate blood profile that includes the random and cumulative blood glucose level can be used as an initial and confirmatory adjuvant to the clinical examination to diagnose and monitor the therapy of patients with DM.

Early diagnosis and management of Type II DM can help restore vision disturbances and prevent further deterioration. Although fasting during Ramadan changes the lifestyle dramatically, it helps in rapid control of the case.

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Author Contribution

AAEA: Conception and design, or acquisition of data, analysis & interpretation, drafting the article or revising it critically for important intellectual content. final approval of the version to be published.

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