

Symptomatic Hypermetropia with Glycemic Control in a Recently Diagnosed Diabetic

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Abstract

Changes in refraction are one of the problems that have been associated with changes in blood glucose level as well as glycemic control. A 52-year-old teacher was seen on account of bilateral poor vision a few days after commencement of treatment for diabetes mellitus. Unaided visual acuity (VA) was count fingers at 3 m in either eye which improved to 6/18 with a pin-hole. Refraction at presentation was +2.50DS/-0.50DC axis 90° in the right eye improving VA to 6/5 and +3.00DS/-0.50DC axis 90° in the left eye improving VA to 6/9. No other ocular abnormality was detected. Uncorrected VA improved to 6/12 and 6/18 in the right and left eyes respectively after 2 weeks of control of blood sugar. Refraction changed to +1.00DS and +2.00DS/-0.50DC axis 140 in the right and left eyes, respectively, improving VA to 6/4 in both eyes. Rapid glycemic control caused temporary severe visual impairment in the patient presented. It is important for the endocrinologist to be aware of this possibility and warn patients to avoid medical mistrust.

Key words: Diabetes mellitus, glycemic control, hypermetropia, refraction

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INTRODUCTION

Diabetes mellitus is a multi-organ disease, and may have various effects on the eyes. Patients with diabetes mellitus may develop various ocular complications including, dry eyes, xanthelasma, recurrent styes, cataract, optic neuropathy, uveitis, refractive errors, and keratopathy as well as diabetic retinopathy. Some of these problems may only constitute ignorable nuisance while some may render the patient temporarily or irreversibly blind.

Changes in refraction are one of such problems that have been associated with changes in blood glucose level as well as glycemic control. The reports of the refractive changes that accompany hyperglycemia have been inconsistent with some authors reporting myopia¹ and others reporting hypermetropia.² A more consistent refractive change has however been recorded with treatment of hyperglycemia although the patients may be visually asymptomatic.³⁻⁵ This is contrary to the finding of Giusti who found hypermetropia at baseline (before treatment) in all 20 type 1 diabetics, who had resolution of refractive change with control of hyperglycaemia.² On the other

hand, transitory hyperglycemia has been found to produce hypermetropia in another group of diabetics.⁶ The report by Sonmez *et al.*⁷ showed that hypermetropic shift is the most common with glycemic control but myopic shift was noticed in some subjects while the rest had no significant change in refraction. Another study showed positive correlation between the magnitude of the maximum hypermetropic change and the plasma glucose concentration on admission, the HbA1c level on admission as well as the daily rate of plasma glucose reduction over the first 7 days of treatment.⁸ Another factor that has been associated with level of hypermetropic change is the background refractive status of the patient; in which patient with background myopia were found to have greater magnitude of hypermetropic shift.⁹

From the above, it is obvious that the refractive changes that may accompany hyperglycemia or its control vary with individuals and may be modified by the baseline blood glucose level, HbA1c level, rate of reduction of blood glucose, background refractive status among other factors.

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The exact cause for this change in refraction has remained largely unexplained although changes in refractive index of the crystalline lens has been suggested because of the difference in refraction observed between phakic and aphakic eyes during periods of induced hyperglycemia.¹ The phakic eyes developed a myopic shift while the aphakic eyes became more hyperopic.¹

These refractive changes have been largely described in Caucasians and Asians, and none has been described in the Nigerian population. The necessity to alert the endocrinologists and others caring for diabetics about the need to counsel patients on symptomatic refractive changes that may accompany rapid glycemic control is the aim of the present report.

CASE REPORT

A 52-year-old secondary school teacher presented at the accident and emergency room of the Wesley Guild Hospital, Ilesa on account of worsening polyuria, headache, and abdominal pain all of 6 days duration. She was previously diagnosed diabetic in a private hospital 3 months earlier but declined treatment. She was not hypertensive. Her blood pressure was 110/70 mmHg and random blood glucose at presentation was 15.2 mmol/L with significant ketonuria and mild proteinuria. Glycosylated hemoglobin was 10.6%. A diagnosis of diabetic ketoacidosis was made. She was given subcutaneous soluble insulin, adequate rehydration and antimalarial, and she was discharged home the following day on oral hypoglycemic agents. The discharge was on patient's request although there had been remarkable improvement in her symptoms and fasting blood glucose was 8.0 mmol/L.

When she was seen at 2 weeks follow-up in the endocrinology outpatient department, she complained of bilateral visual blurring which started a few days after the commencement of glycemic control. This was associated with inability to read with or without her previous spectacle. Fasting blood sugar was 10.2 mmol/L at follow-up and there was no glycosuria or ketonuria. She was referred to the eye clinic with a provisional diagnosis of diabetic retinopathy with possible glaucoma.

Examination revealed a healthy looking middle age woman and she weighed 64 kg. Her blood pressure was 110/70 mmHg. Her visual acuity (VA), using the Snellen chart was count finger at 3 m, improving to 6/18 with a pin-hole. Refraction at presentation in the eye clinic was +2.50DS/−0.50DC axis 90° improving vision in the right eye to 6/5 and +3.00DS/−0.50DC axis 90° improving the vision in the left eye to 6/9; a reading addition of +2.50DS improved near vision to N5. Anterior segment examination with Haag Streit slit lamp (AG Switzerland) biomicroscope was normal in both eyes. Intraocular pressure with Goldmann applanation tonometer was 18 mmHg in either eye. Dilated fundoscopy with 78D lens at the slit lamp revealed clear media, healthy round pink disc with cup-disc ratio of 0.3, normal vessels and macula in both eyes. There was no evidence of diabetic retinopathy. She was offered a temporary spectacle to enable her cope with her urgent job demands but was adequately educated on the

possibility of a change in refraction as well as possible need for change of spectacle with change in blood glucose level.

She was referred back to the endocrinologist for optimization of glycemic control. When seen 2 weeks after, her fasting blood glucose was 6.1 mmol/L and unaided VA had improved to 6/12 and 6/18 in the right and left eye respectively. Refraction for the right eye changed to +1.00DS improving vision to 6/4 while that of the left eye changed to +2.00DS/−0.50DC axis 140° also improving vision to 6/4; a reading addition of +2.25DS gave the patient N5 near vision. Meanwhile other ocular findings remained as previously documented.

DISCUSSION

The refractive changes associated with diabetes mellitus may be acute or chronic. The hypermetropic change recorded with glycemic control in our patient was similar to report from other studies in which there were hypermetropic changes with rapid glycemic control.^{4,5} The high HbA1c level in our patient was similar to that of a previous study in which high HbA1c was associated with high hypermetropic change.¹⁰ The contribution of background refractive status to the hypermetropic change observed with glycemic control as suggested by Lin *et al.*⁹ could not be ascertained in our patient since there was no record of baseline refractive status and her reading spectacle was obtained over the counter. Our findings of high random blood glucose of 15.2 mmol/L and HbA1c of 10.6% on admission agrees with the relationship established by Okamoto *et al.*⁸ that both high presenting blood glucose and glycosylated hemoglobin levels on admission contributed to the magnitude of hypermetropic shift.

The present patient was a teacher who was diagnosed with diabetes mellitus 3 months earlier but declined treatment. She also obtained her reading spectacle over the counter without any proper eye examination despite her level of education. These behaviors suggest a poor health seeking habit on the part of the patient. The sudden reduction in her vision with acceptance of treatment dramatically impaired her vision causing inability to perform her daily tasks (reading and teaching). This severe visual handicap though temporary may discourage a patient from compliance with treatment, especially one who is likely to have a poor health seeking habit.

It is important for the ophthalmologist to inquire about glycemic control from diabetics, requesting change of spectacle prescription. If a patient requires a temporary spectacle as demonstrated in the present patient, such a patient should be warned about likelihood of spectacle intolerance after 1–2 months. If this is not done, it may create distrust in medical care. When possible, prescription of spectacles should be delayed until a stable refraction is obtained.

It is important for the endocrinologists and others caring for patients with diabetes mellitus to be aware of this temporary but significant visual change that may accompany their treatment and adequately counsel them about it.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Gwinup G, Villarreal A. Relationship of serum glucose concentration to changes in refraction. *Diabetes* 1976;25:29-31.
2. Giusti C. Transient hyperopic refractive changes in newly diagnosed juvenile diabetes. *Swiss Med Wkly* 2003;133:200-5.
3. Huntjens B, Charman WN, Workman H, Hosking SL, O'Donnell C. Short-term stability in refractive status despite large fluctuations in glucose levels in diabetes mellitus type 1 and 2. *PLoS One* 2012;7:e52947.
4. Saito Y, Ohmi G, Kinoshita S, Nakamura Y, Ogawa K, Harino S, *et al.* Transient hyperopia with lens swelling at initial therapy in diabetes. *Br J Ophthalmol* 1993;77:145-8.
5. Eva PR, Pascoe PT, Vaughan DG. Refractive change in hyperglycaemia: Hyperopia, not myopia. *Br J Ophthalmol* 1982;66:500-5.
6. Tai MC, Lin SY, Chen JT, Liang CM, Chou PI, Lu DW. Sweet hyperopia: Refractive changes in acute hyperglycemia. *Eur J Ophthalmol* 2006;16:663-6.
7. Sonmez B, Bozkurt B, Atmaca A, Irkec M, Orhan M, Aslan U. Effect of glycemic control on refractive changes in diabetic patients with hyperglycemia. *Cornea* 2005;24:531-7.
8. Okamoto F, Sone H, Nonoyama T, Hommura S. Refractive changes in diabetic patients during intensive glycaemic control. *Br J Ophthalmol* 2000;84:1097-102.
9. Lin SF, Lin PK, Chang FL, Tsai RK. Transient hyperopia after intensive treatment of hyperglycemia in newly diagnosed diabetes. *Ophthalmologica* 2009;223:68-71.
10. Li HY, Luo GC, Guo J, Liang Z. Effects of glycaemic control on refraction in diabetic patients. *Int J Ophthalmol* 2010;3:158-60.