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Case Report

Refractive Changes in a Recently Diagnosed Diabetic Patient

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Abstract

Diabetes mellitus is a group of metabolic disorders characterized by a high blood sugar level over a prolonged period of time. Hyperglycemia is the most significant risk factor for diabetes and fluctuating levels can result in fluctuating vision. Transient refractive changes are well-recognized features of diabetes and these patients may have both short-term as well as permanent refractive alterations. I present a case of a newly diagnosed type 2 diabetic patient who presented with hyperglycemic induced- hypermetropia on initial examination, with variation in refraction one month after.

Keywords: Diabetes Mellitus; Hyperglycemia; Refractive Error; Visual Acuity

Introduction

Diabetes mellitus is the most prevalent endocrine disorder in most developed nations. A total of 11.2 million Nigerians (1 out of every 17 adults) is estimated to be living with the disease [1]. Diabetes is a group of metabolic disorders characterized by a high blood sugar level over a prolonged period of time [2]. There are three main types of diabetes mellites, these are type 1 or juvenile diabetes which result from the pancreas failure to produce insulin due to loss of beta cells and type 2 or adult -onset diabetes due to insulin resistance. There is a third type called gestational diabetes which occurs when pregnant women without a previous history of diabetes develop high blood sugar. Hyperglycemia is the most significant risk factor for diabetes and thus the focal point in its diagnosis and management. Symptoms include frequent urination, increased thirst, increased appetite dry mouth and mood changes. Serious long-term complications include cardiovascular disease, stroke, chronic kidney disease, foot ulcers, damage to the nerves, damage to the eyes and cognitive impairment [3]. Ocular complications include cataract, glaucoma, diabetic retinopathy, diabetic macular edema and refractive changes. The effect of blood glucose on the refractive status of diabetes have much since being hypothesized. Fluctuating blood glucose levels are known to cause fluctuating vision. There is a correlation between the change in glucose levels and the ability of the crystalline lens to maintain a sharp focus. These changes can alter the refractive power by as much as 3 or 4 diopters of hyperopia or myopia. Such changes do not occur when good glycemic control which is regulated within a narrow limit is achieved [4].

Transient refractive changes are well-recognized features of diabetes and these patients may have both short-term as well as permanent refractive alterations. In uncontrolled or undiagnosed patients with diabetes, fluctuations in blood glucose levels are often accompanied by changes in refractive power error [5].

I present a case of a patient who was recently diagnosed with type 2 diabetes mellites and presented to the clinic with complains of blurry vision.

Case Report

A 54-year-old male presented to the clinic with complains of blurry vision at far and near. The reduction in vision occurred two days ago on awakening with no prior history of visual complaints except one regarding reading, for which he was given spectacle lenses. Case history revealed he was diagnosed with type 2 diabetes mellitus 3 weeks prior at the local health center after a series of laboratory tests were conducted. He was placed on metformin 850 mg 1 daily orally by his physician and asked to see an eye care practitioner. On examination, unaided distance visual acuity was 6/48 in both eyes while near acuity was N12. External observation was normal, tonometry using the Reichert NCT was 15mmhg in both eyes, fundus view with a direct ophthalmoscope revealed clear media and a cup-to-disc ratio of 20% in both eyes. The macula was normal with a bright fovea reflex. There was no sign of microvascular alterations or hemorrhages. Fasting blood sugar at 10:00am was 9.2 mmol/L.

On refraction, the patient accepted +1.25DS in both eyes which gave a visual acuity of 6/5 and addition of +2.25 (N5). Final diagnosis was hyperglycemia-induced hypermetropia. A new pair of lenses was not dispensed and he was asked to return for another refraction one month due to the possibility of having differing results when he is in a glycemic controlled state. He was also asked to bring his charted FBS result for the month when returning to the clinic.

On reexamination one month later, his unaided distance visual acuity was 6/5 in both eyes with no further complain of blur vision at distance while the near acuity remained N12. Fasting blood sugar at 10:00 am was 6.0 mmol/L and has been between 9.2 mmol/L- 5.4 mmol/L in the last four weeks. Tonometry was 16 mmhg (both eyes) at 11:30 am. On subjective refraction, patient accepted +0.25DS in both eyes (6/5) and an addition of +2.25 (N5). After counseling on the effect of uncontrolled diabetes on refraction, and possible implications for diabetic retinopathy and other complications associated with the disease, he was prescribed progressive lenses and asked to return for follow-up examination six months after.

Visual acuity (Unaided)	Initial measurement	After 1 month
Right eye	6/48 (N12)	6/5 (N12)
Left eye	6/48 (N12)	6/5(N12

Table 1: Patient's visual acuity using the Snellen's chart on first visit and on reexamination.

Comparison of FBS levels and refractive error

	Initial measurement	After 1 month
FBS level	9.2 mmol/L.	6.0 mmol/L
Refractive Error	+1.25DS (BE) Add +2.25	+0.25DS (BE) Add +2.25

Table 2: Shows the change in refraction after one month.

Discussion and Conclusion

Hyperglycemia has been recognized as one of the major causes of transient changes in refractive error in diabetic patients [6] even as far back as the nineteenth century [7]. Different studies have hypothesized that hyperglycemia leads to a myopic shift and hypoglycemia a hyperopic shift. However, the exact effects are likely to be complex and to vary with the individual patient, since the power of the lens will be affected by any changes in thickness, surface curvature and gradient of refractive index, and these changes will depend on the individual's age and their response to such factors as the activity of aldose reductase in the lens epithelial cells [8].

In this case report, a hypermetropic shift was seen in a previously presbyopic patient with no prior lens correction for distance vision due to high blood glucose levels. The mechanism is thought to be due to a decrease in refractive index of the crystalline lens. Glucose accumulation in the lens may also result in increase in its curvature and a shift towards myopia [9].

Although people with diabetes experience presbyopia earlier than non- diabetics due to lowered amplitude of accommodation, there was no difference between our patients initial near acuity and on reexamination. This might be related to the short duration of the diabetes [10].

Inadequate glycemic control may cause significant difficulties in everyday tasks and this often requires frequent change of lenses. Maintaining a stable blood glucose level before dispensing glasses is essential in reducing variation in refraction in newly diagnosed diabetics.

Eye care practitioners should consider the possibility of undiagnosed diabetes if a patient complains of a bilateral, unexpected or rapid change of vision or prescription. If diabetes is suspected, the eyecare practitioner may postpone prescribing spectacles until the refractive error has stabilized, which generally occurs when the patient's diabetes is better controlled.

Bibliography

1. Uloko AE., *et al*. "Prevalence and Risk Factors for Diabetes Mellitus in Nigeria: A Systematic Review and Meta-Analysis". *Diabetes Therapy* 9.3 (2018): 1307-1316.

2. "About diabetes". World Health Organization (2014).

3. Saedi E., *et al*. "Diabetes mellitus and cognitive impairments". *World Journal of Diabetes* 7.17 (2016): 412-422.

4. Daniel GV and Taylor A. "General Ophthalmology". 4th Fourteenth edition. A. Lange medical book. (1995): 306-309.

5. Lin SF., *et al*. "Transient hyperopia after intensive treatment of hyperglycemia in newly diagnosed diabetes". *Ophthalmology* 223.1 (2008): 68-71.

6. Yarbağ A., *et al*. "Refractive errors in patients with newly diagnosed diabetes mellitus". *Pakistan Journal of Medical Sciences* 31.6 (2015): 1481-1484.

7. Grant G., *et al*. "Relationship of Serum Glucose Concentration to Changes in Refraction." From the Division of Endocrinology, University of California, Diabetes 25.1 (1976): 29-31.

8. Kubo E., *et al*. "Pathway-dependent osmotic and oxidative stresses in aldose reductase-mediated apoptosis in human lens epithelial cells: role of AOP2". *Biochemical and Biophysical Research Communications* 314 (2004): 1050-1056.

9. Mantyjarvi M. "Myopia and diabetes. A review". *Acta Ophthalmologica Supplements* 185 (1988): 82-85.

10. Adnan., *et al*. "Amplitude of accommodation in type 1 diabetes". *Investigative Ophthalmology and Visual Science* 55 (2014): 7014-7018.