

# Changing Trends in the Pattern of Eye Diseases in Persons Living with Diabetes Mellitus – Data from a Tertiary Health Facility, South East, Nigeria

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## Abstract

**Background:** Diabetes mellitus (DM) is associated with eye diseases such that the diabetic patients may even first present to the ophthalmologist where the diagnosis of DM is made. The trends in the pattern of eye diseases in diabetic patients are becoming worrisome and most of the complications in the eyes may progress to visual loss and blindness. The burden and pattern of eye diseases in persons living with diabetes in the city of Aba, South East Nigeria had to, therefore, be revisited. **Subjects and Methods:** This was a 2-year prospective study in which all diabetic patients referred to or presenting with eye complaints at the Ophthalmology clinic of Abia State University Teaching Hospital (ABSUTH) Aba, Nigeria between June 2021 and December 2022 were consecutively recruited into the study. History and examination of the patients were done by optometrists and ophthalmologists. Relevant data were obtained and analyzed using SPSS version 23.0 and  $p < 0.05$  was considered statistically significant. **Results:** Subjects recruited into the study were 134; 65 (48.5%) males and 69 (51.5%) females. Diabetic ocular complications were more in the middle aged and these included heterochromia (58%) in the right eye, cataract (53.7%) in the left eye, glaucoma (44.8%) and diabetic retinopathy (10.4%). Iris lesions (heterochromia and rubeosis iris) were predominant in 115 (85.8%) of the right eye while cataract was predominantly noted in 75 (55.9%) of the left eye. About a third of the subjects were blind and the posterior segments of both eyes were rarely affected by diabetes mellitus. **Conclusion:** Ocular complications of DM constitute a major threat to vision in persons living with diabetes in the city of Aba, Southeast Nigeria. Early diagnosis, prompt treatment and preventive measures should be emphasized involving all the stakeholders.

**Keywords:** Burden, Diabetes Eye Diseases, Patterns, Southeast Nigeria, Trends.

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## Introduction

Diabetes mellitus (DM) is a metabolic disease characterized by chronic hyperglycaemia resulting in associated microvascular (the eyes, kidneys and nerves) and macrovascular complications.<sup>[1,2]</sup> Data from the International Diabetes Federation (IDF) shows that there are currently 537 million persons living with diabetes worldwide aged between 20 and 79, with that figure expected to rise to 643 million people by 2030 and 783 million by 2045. The WHO estimates that Nigeria has the largest number of people living with diabetes in Africa.<sup>[3,4,5]</sup> The prevalence of DM is rising especially among sub Saharan Africans due to ageing of the population,<sup>[6,7]</sup> improving survival of people living with diabetes, increased urbanization and westernization, dietary changes, sedentary lifestyles and obesity. Complications of DM are legion including diabetic retinopathy, diabetic nephropathy, atherosclerosis, hypercoagulability, coronary heart disease, abdominal obesity, hypertension, hyperlipidemia, cerebrovascular disease, coronary artery disease, foot

damage, skin complications, Alzheimer's disease, hearing loss, and depression.<sup>[8]</sup> It has been noted that uncorrected refractive errors and ocular diseases such as glaucoma, diabetic retinopathy, age-related macular degeneration and cataract are the major causes of visual impairment worldwide.<sup>[9]</sup> Diabetes related eye complications can involve any part of the eye from the lid to the anterior and posterior segments of the eyes.<sup>[1]</sup> Diagnosis of DM is made in some persons in the Ophthalmology clinic when they present with eye complaints.<sup>[9]</sup>

In a study in South Africa, DM retinopathy was third after cataract and glaucoma as the leading cause of blindness in people living with diabetes.<sup>[10]</sup> In a Central African study,<sup>[11]</sup> it was reported that thirty-four percent of diabetic patients had retinopathy and 13% were affected by cataract. In a study in Enugu in 2020,<sup>[12]</sup> the commonest ocular morbidities were cataract 53 (66.3%), glaucoma 44 (55%), diabetic retinopathy 25 (32.1%), diabetic macular oedema 25 (32.1%), refractive errors 24 (30%), hypertensive retinopathy (17.9%), and age related macular degeneration (ARMD) (8.8%). In the same report, fifty-nine (73.8%) had

mild visual impairment, 12 (15.0%) moderate visual impairment, and 9 (11.3%) were blind<sup>[12]</sup>. In an earlier study in Enugu, Magulike et al,<sup>[13]</sup> reported that out of the diabetic patients seen in the outpatient Ophthalmology clinic, 22.1% had cataract, 12.8% had DM retinopathy, 4.7% had glaucoma and 2.0% were blind but in Uyo,<sup>[14]</sup> it was reported that cataract (56.4%) was the leading DM ocular complication followed by non-proliferative diabetic retinopathy (31%) and glaucomatous disc cupping (11.4%). Nkpozi et al in their 6-year retrospective study in Aba,<sup>[15]</sup> noted that cataract alone or with other diabetic eye diseases was the commonest diabetic eye disease at 50%. In the same study, while none of the study subject was blind and glaucoma was low at 0.8%, systemic hypertension and age-related macula degeneration (ARMD) were the commonest comorbid conditions. In another study, diabetic retinopathy was the leading cause of preventable blindness in adults and the potential risks of blindness in an individual with DM was 2.4 times higher than that of a person without diabetes.<sup>[16,17]</sup> With increasing prevalence of DM worldwide, diabetic eye diseases are increasingly becoming problems to persons living with diabetes. Because there are changes in the pattern of DM eye complications, it is worthwhile to keep a tab on these recent trends in the pattern and magnitude of diabetic eye diseases in the commercial city of Aba. Currently, there is a dearth of published studies on the recent trends in the pattern of diabetic eye diseases in Aba, Nigeria, hence the need for this study. This done, one can then design an effective program for management and prevention of blindness from DM.

## Subjects and Methods

### Study design and Setting

This was a prospective descriptive study conducted at the Ophthalmology clinic of Abia State University Teaching Hospital (ABSUTH) Aba, Nigeria between June 1 2021 and December 31, 2022. Each consenting adult person living with diabetes is consecutively recruited and data collected from him/her. The Ophthalmology clinic in ABSUTH operates two days every week in which all patients with eye complaints or referred from peripheral hospitals are attended to irrespective of their diabetes status. The hospital (ABSUTH) is the only teaching hospital in Aba, a commercial city in the South East region of Nigeria and gets referrals from all the primary and secondary health facilities in Aba and the neighboring states. The Ophthalmology clinic serves both male and female adult patients from where some of the patients are admitted into the wards or go for surgery. The Department of Ophthalmology, ABSUTH, Aba is a unit of Surgery Department headed by a consultant in the Unit and assisted by surgical residents and interns. The Ophthalmology clinic has other support staffs such as the nursing unit, medical records, pharmacy section and the cleaners.

### Inclusion criteria

All patients with a diagnosis of diabetes mellitus with eye complaints or referred for ophthalmological review were included into the study. Patients with repeat visits within the study period were counted as one irrespective of number of visits.

### Exclusion criteria

Persons living with diabetes who had had eye surgery and those who did not give informed consent were excluded from the study.

### Recruitment and Data Collection

From June 1, 2021 to December 31, 2022, 134 subjects that met the inclusion criteria for the study were recruited. Age, gender, co-morbid conditions and duration of DM in the participants were noted. Participants underwent eye examination including visual acuity (Snellen's chart), refraction (autorefractor), tonometry (glaucoma), slit lamp examination of anterior segment and dilated posterior segment examination with 90DS lens. Identified ocular conditions were documented. The eye findings/diagnosis was the final diagnosis of the ophthalmologists.

### Ethical consideration

Ethical approval was obtained from the Institution's Health Research Ethics Committee before commencing the study. Informed written consent was obtained from each subject before recruitment.

### Statistical Analysis

The Statistical Package for Social Sciences (SPSS Inc. Chicago IL. USA) version 23.0 statistical software was used for data entry and analysis. For continuous variables such as the ages of the study subjects, duration of DM and their random blood glucose, mean values and standard deviations (SD) were calculated and the means compared using independent two samples t-test. Categorical variables such as the gender, eye findings/diagnosis and co-morbid conditions were summarized using proportions expressed in percentages. The categorical variables were compared using the non-parametric test, chi square test. The level of statistical significance was set at  $p < 0.05$ .

## Results

A total of 134 persons living with diabetes; 65 (48.5%) males and 69 (51.5%) females were interviewed and screened. Mean age of the subjects was 58.38+12.49 years; aged between 32-90 years. Mean age of the males was 60.25+13.29 years while that of the females was 56.62+11.50 years; the difference in the mean ages of the male and female participants was not statistically significant ( $t = -1.69, p = 0.09$ ). Diabetic eye diseases were more common in the middle aged (53%) persons living with diabetes than in the young and elderly population [Table 1]. The commonest ocular complications were heterochromia (58%) in the right eye, cataract (53.7%) in the left eye, glaucoma (44.8%) and diabetic retinopathy (10.4%).

Striking differences were noted in the anterior segments of the right and left eyes – iris lesions (heterochromia and rubeosis iris) were predominant in 115 (85.8%) of the right eye while cataract was predominantly noted in 72 (53.7%) of the left eye [Table 2].

Based on the World Health Organization’s current grading of visual acuity, 14.9% and 32% of the subjects had severe visual impairment and blindness in their right eyes

respectively while 10.9% and 32% of the subjects had severe visual impairment and blindness in the left eyes respectively [Table 3]. Poor blood glucose control was noted as the patient's mean blood glucose level was 213.3mg/dl. Posterior segment lesions were rare in the subjects as shown in [Table 4] while systemic hypertension remained the commonest co-morbid disease.

**Table 1: Distribution of the subjects stratified by age groups in ABSUTH Ophthalmology clinic, Aba within the study period.**

Age group	Frequency	Percent
20-39	8	6
40-60	71	53
61 and above	55	41
Total	134	100

**Table 2: Frequency of eye diseases in DM patients attending the Ophthalmology clinic, ABSUTH, Aba.**

Diabetic Ocular complications	Frequency of complications	Percent
Glaucoma	60	44.8
Diabetic retinopathy – Right eye	13	9.7
Diabetic retinopathy – Left eye	14	10.4
Right Anterior Segment lesions		
• Corneal opacities	1	0.7
• Heterochromia	75	55.9
• Rubeosis iris	40	29.9
Left Anterior Segment lesions		
• Lid mass	1	0.7
• Ptosis	2	1.5
• Corneal opacities	3	2.2
• cataract	72	53.7

**Table 3: Distribution of Visual Impairment among diabetes mellitus participants in their right and left eyes**

VAR	Frequency	Percent	WHO grading of VA
>6/18	30	22.4	Mild or nil visual impairment
6/18 - 6/60	41	30.6	Moderate visual impairment
6/60 - 3/60	20	14.9	Severe visual impairment
3/60 - 1/60	1	0.7	Blindness
1/60 - LP	31	23.1	Blindness
No light perception	11	8.2	Blindness
Total	134	100	
VAL	Frequency	Percent	WHO grading of VA
>6/18	38	28.4	Mild or nil visual impairment
6/18 - 6/60	39	29.1	Moderate visual impairment
6/60 - 3/60	14	10.4	Severe Visual impairment
3/60 - 1/60	1	0.7	Blindness
1/60 - LP	30	22.4	Blindness
No light perception	12	8.9	Blindness
Total	134	100	

Key: VAR/VAL = visual acuity of the right/left eyes, LP= light perception, VA = visual acuity, WHO = world health organisation

**Table 4: Distribution of posterior segment lesions in the right and left eyes**

Posterior segment lesions	Frequency (R Eye)	Frequency (L Eye)
No posterior segment lesions	128 (95.5%)	130 (97.0%)
Vitreous haemorrhage	5 (3.7%)	4 (3.0%)
Synchysis synchylaris	1 (0.7%)	0

## Discussion

The main findings of this study included a predominance of iris lesions and cataract as the main eye complications of diabetes mellitus and blindness in about a third of the study population. Glaucoma was a common eye complication of

DM at 44.8% while systemic hypertension remained the commonest co-morbid illness in the Ophthalmology Clinic of ABSUTH, Aba.

In this report, cataract occurred in 53.7% of the subjects which is lower than the 66.3% and 56.4% reported in Enugu<sup>[12]</sup> and Uyo<sup>[14]</sup> respectively but greater than the 50%

and 22.1% reported in an earlier study in Aba,<sup>[15]</sup> and South Africa,<sup>[18]</sup> respectively. Reasons for these disparities in the frequency of cataract as an ocular complication of DM are not known but there is an increasing prevalence of cataract in this report compared to an earlier report in Aba.<sup>[15]</sup> This could be due to increasing prevalence of DM arising from obesity, sedentary lifestyles, westernization of their diets and increasing age of the populace. Iris lesions (heterochromia and rubeosis iris) occurred very commonly in the right eyes of the subjects (55.9% and 29.9% respectively) and reasons for these lesions occurring more in the right eyes of persons living with diabetes cannot readily be explained. The implication of this high frequency of cataract and iris lesions in the diabetic patients of the outpatient Ophthalmology clinic visits in ABSUTH, Aba is that the diabetes care team and the Ophthalmology unit need to cooperate more with each other aimed at preventing visual loss and blindness in persons living with diabetes.

In the index study, blindness occurred in a third of the subjects in sharp contrast to an earlier study in Aba by Nkpozi et al,<sup>[15]</sup> where blindness was not reported but cataract alone and with other eye complications constituted the commonest diabetes ocular complication. The burden of blindness in the index study is in keeping with the report by Cheung et al that the potential risks of blindness in an individual with DM was 2.4 times higher than that of a person without diabetes<sup>[10]</sup>. Blindness at 32% in this study is much more than the 2 participants that were blind in an earlier Enugu<sup>[13]</sup> report and the 11.3% reported in a recent Enugu<sup>[12]</sup> study. This is worrisome because some of the diabetic causes of these vision loss and blindness are treatable and preventable if there is maximum cooperation between the diabetologists and the Ophthalmologists.

In this study, glaucoma (44.8%) was a common complication in people living with diabetes unlike in the prior study by Nkpozi et al,<sup>[15]</sup> in the same centre where glaucoma was rare in the subjects at 0.8%. Similarly, glaucoma in Enugu,<sup>[13]</sup> (4.7%) and Uyo<sup>[14]</sup> (11.4%) was much lower than in the index study which, in turn, was lower than the 55% reported in a latter study in Enugu,<sup>[12]</sup> and in South Africa where glaucoma even came second after cataract. This is, probably, because of the current global increase in DM prevalence.

Diabetic retinopathy (9.7%) in the index study is comparable to the previous reports in Aba and Enugu at 9.5% and 12.8% respectively but lower than the 32.1%, 36% and 32.6% frequency of DM retinopathy noted in other Nigerian tertiary hospital based studies in Enugu,<sup>[12]</sup> Kano,<sup>[19]</sup> and Ado Ekiti,<sup>[20]</sup> respectively. It is important to note that DM retinopathy has been found to be an important sight threatening complication of DM. It is, also, comparable to the 7.4% frequency in a cross sectional study in Rivers,<sup>[21]</sup> State, South-south, Nigeria. The implication of these findings is that with routine screening of persons living with DM for DM retinopathy, many would be saved the agony of treatable and preventable visual loss and blindness.

Moreover, more middle-aged persons (53%) were afflicted by DM eye complications in this study and this finding is

comparable to the prior report in Aba<sup>[15]</sup> (60.3%). A situation where this age group is predominantly affected by DM eye complications is not healthy for the economy as this age group is the source of the country's work force. Systemic hypertension came up top as the predominant comorbid illness noted in this study probably because systemic hypertension is commonly a risk factor of DM. It is not clear whether these eye conditions including cataract, glaucoma, visual field defects, refractive errors, macula oedema and age related macular degeneration occurred as diabetic eye complications or same as would have been found in the general population at middle or elderly ages.

Finally, age related macular degeneration, diabetic macular oedema and posterior segment lesions were not reported in this study. Reasons why they were not reported in the study even though their frequencies in the other Nigerian hospital based studies,<sup>[12,15,19,20]</sup> were high cannot easily be given but could be from the expertise of the manpower and or sophistication of instruments used. It could, also, probably, be a consequence of improved diabetes education and awareness of the need for regular ophthalmic check for DM patients. DM increasing with increasing age is in support of Voleti and Hubschman,<sup>[22]</sup> who noted that the prevalence of vision problems is strongly associated with ageing and this compromised visual function affects individuals' ability to perform activities of daily living.

## Conclusion

Cataract, glaucoma, blindness and DM retinopathy with or without refractive errors are common diabetic ocular complications in the commercial city of Aba, South East, Nigeria where a third of the subjects were blind. Screening of DM patients for eye complications has the potential to reduce the incidence of sight threatening visual impairment and blindness.

## References

1. Alberti KG, Zimmet PZ. New diagnostic criteria and classification of diabetes--again? *Diabet Med.* 1998;15(7):535-6.
2. Alberti KG, Zimmet PZ. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. *Diabet Med.* 1998;15(7):539-53.
3. Rodríguez IA, Serafini M, Alves IA, Lang KL, Silva FRMB, Aragón DM. Natural Products as Outstanding Alternatives in Diabetes Mellitus: A Patent Review. *Pharmaceutics.* 2022;15(1):85. doi: 10.3390/pharmaceutics15010085.
4. King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: prevalence, numerical estimates, and projections. *Diabetes Care.* 1998;21(9):1414-31. doi: 10.2337/diacare.21.9.1414.
5. Helms RB. Implications of population growth on prevalence of diabetes. A look at the future. *Diabetes Care.* 1992;15 Suppl 1:6-9. doi: 10.2337/diacare.15.1.s6.
6. Wachtel P. Household saving and demographic change, 1950-2050. *Res Popul Econ.* 1984;5:217-33.
7. Uloko AE, Ofoegbu EN, Chinenye S, Fasanmade OA, Fasanmade AA, Ogbera AO, et al. Profile of Nigerians with diabetes mellitus - Diabcare Nigeria study group (2008): Results of a multicenter study. *Indian J Endocrinol Metab.* 2012;16(4):558-64. doi: 10.4103/2230-8210.98011.
8. Kumar S, Mittal A, Babu D, Mittal A. Herbal Medicines for Diabetes

- Management and its Secondary Complications. *Curr Diabetes Rev.* 2021;17(4):437-456. doi: 10.2174/1573399816666201103143225.
9. Resnikoff S, Keys TU. Future trends in global blindness. *Indian J Ophthalmol.* 2012;60(5):387-95. doi: 10.4103/0301-4738.100532.
  10. Cheung N, Mitchell P, Wong TY. Diabetic retinopathy. *Lancet.* 2010;376(9735):124-36. doi: 10.1016/S0140-6736(09)62124-3.
  11. Rolfe M. Diabetic eye disease in Central Africa. *Diabetologia.* 1988;31(2):88-92. doi: 10.1007/BF00395553.
  12. Khandekar RB, Tirumurthy S, Al-Harby S, Moorthy NS, Amir I. Diabetic retinopathy and ocular co-morbidities among persons with diabetes at Sumail Hospital of Oman. *Diabetes Technol Ther.* 2009;11(10):675-9. doi: 10.1089/dia.2009.0032.
  13. Magulike NO, Chuka-Okosa CM, Oli JM. Diabetic eye disease in Enugu South Eastern Nigeria – A preliminary Report. *Nigerian J Ophthalmol.* 2003;11(1):30–33.
  14. Abraham EG, Umoh V. Ocular health status of diabetes mellitus patients in Uyo, South- South Nigeria. *J Dent Med Sci.* 2013; 9(2): 24 – 28.
  15. Nkpozi MO, Adukwu BU, Ugwu ET. Pattern of diabetic eye diseases in a tertiary health facility, southeast. Nigeria. *J Biomed Res. Clin Pract.* 2020; 3(1): 230-234.
  16. Genz J, Scheer M, Trautner C, Zöllner I, Giani G, Icks A. Reduced incidence of blindness in relation to diabetes mellitus in southern Germany? *Diabet Med.* 2010;27(10):1138-43. doi: 10.1111/j.1464-5491.2010.03081.x.
  17. Icks A, Trautner C, Haastert B, Berger M, Giani G. Blindness due to diabetes: population-based age- and sex-specific incidence rates. *Diabet Med.* 1997;14(7):571-5. doi: 10.1002/(SICI)1096-9136(199707)14:7<571::AID-DIA384>3.0.CO;2-Y.
  18. Claessen H, Kvitkina T, Nares M, Trautner C, Bertram B, Icks A. Markedly decreasing incidence of cause-specific blindness in Saxony (Eastern Germany). *Graefes Arch Clin Exp Ophthalmol.* 2021;259(5):1089-1101. doi: 10.1007/s00417-020-04885-4.
  19. Lawan A, Mohammed TB. Pattern of diabetic retinopathy in Kano, Nigeria. *Ann Afr Med.* 2012;11(2):75-9. doi: 10.4103/1596-3519.93528.
  20. Ajayi IA, Raimi TH, Omotoye OJ, Ajite KO. Ocular findings in a diabetic Retinopathy Screening clinic in South west Nigeria. *Int J Med Med Sci.* 2011;4(3):023-027.
  21. Ogbera AO, Ekpebegh C. Diabetes mellitus in Nigeria: The past, present and future. *World J Diabetes.* 2014;5(6):905-11. doi: 10.4239/wjd.v5.i6.905.
  22. Voleti VB, Hubschman JP. Age-related eye disease. *Maturitas.* 2013;75(1):29-33. doi: 10.1016/j.maturitas.2013.01.018.

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