AGE AND OBESITY AS RISK FACTORS FOR DIABETES IN AFRICANS WITH HIV

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BACKGROUND

- Diabetes is an important comorbidity in ageing populations.
- Age, male sex and obesity are risk factor for diabetes.
- We evaluated whether age, sex and obesity are independent risk factors for diabetes mellitus in people of African ancestry living with HIV in the UK.

METHODS

GEN-AFRICA study design

- Cross-sectional study of participants in the GEN-AFRICA study, a cohort individuals of African ancestry aged >18 years receiving routine HIV care in 15 clinics across the United Kingdom; participants were enrolled between 05/2018 and 02/2020, provided height and weight measurements, and completed questionnaires on comorbidities and medications. Kidney function (estimated glomerular filtration rate [GFR], proteinuria [urine protein/creatinine ratio, uPCR], and glycosuria) was assessed.
- The study included participants of sub-Saharan African ancestry. Participants of Caribbean or mixed ancestry (n=559) were excluded, as were those without height/weight measurements (n=40), diabetes status (n=21), or end-stage kidney disease (n=87). Individuals with low BMI (<18.5 kg/m^2), n=12) were also excluded.

Exposures, outcomes and covariates

Exposures of interest	• Age, sex, obesity (BMI >30 kg/m^2)
Primary Outcome	• Diabetes mellitus (self-reported; corroborated through review of medical records)

Covariates

Demographics	Age, gender, sexual orientation
HIV measures	Prior AIDS, time since HIV diagnosis, use of ART, nadir/current CD4, HIV viral load
Co-infections	Hepatitis B surface antigen +, hepatitis C antibody +
Co-morbidities	Obesity, hypertension (self-reported), renal impairment (eGFR 15-60 mL/min/1.73m^2, proteinuria (uPCR >15 mg/mmol)

Statistical analysis:

- Associations between covariates were evaluated using logistic regression; variables with p<0.1 in univariable analysis were included in multivariable models.
- Models were a priori stratified by sex.
- Smoking status, HIV transmission risk and cardiovascular disease were not included due to low numbers, collinearity and likely reverse-causality respectively.

RESULTS

- 218/2308 (9.4%) were diagnosed with diabetes (99% Type 2)
- They were more likely to be male, older, obese, with lower nadir CD4 cell count, hypertension, renal impairment and proteinuria

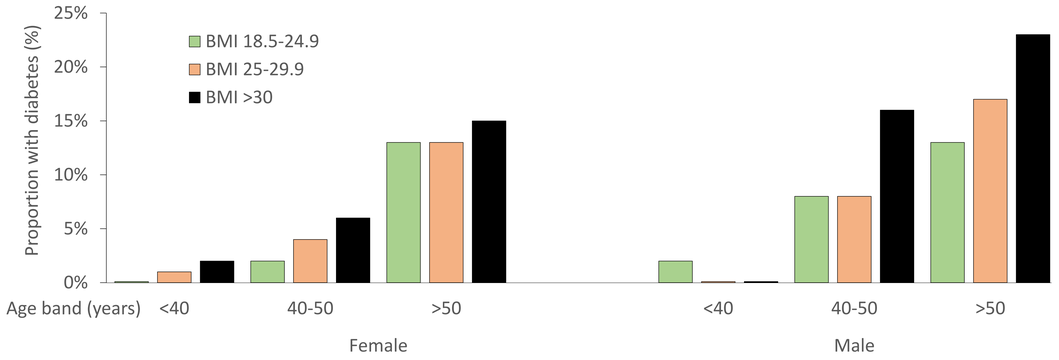
Table 1: Baseline characteristics

		Overall N=2,308	No diabetes N=2,090	Diabetes N=218	P value
Demographics	Male (vs. female)	866 (37.5%)	755 (36.1%)	111 (50.9%)	<0.001
	Age in years				<0.001
	<40	423 (18.3%)	419 (20.0%)	4 (1.8%)	
	40-50	905 (39.2%)	847 (40.5%)	58 (26.6%)	
	>50	980 (42.5%)	824 (39.4%)	156 (71.6%)	
	HIV risk factor (heterosexual)	2,012 (87.2%)	1,821 (87.1%)	191 (87.6%)	0.14
	Region of ancestry				0.82
	South Africa	554 (24.0%)	497 (23.8%)	57 (26.1%)	
	East Africa	770 (33.4%)	696 (33.3%)	74 (33.9%)	
	Central Africa	156 (6.8%)	142 (6.8%)	14 (6.4%)	
	West Africa	828 (35.9%)	755 (36.1%)	73 (33.5%)	
HIV-parameters	Years HIV diagnosis	14.1 (6.3)	14.0 (6.2)	14.8 (6.8)	0.083
	Currently on ART	2,285 (99.0%)	2,070 (99.0%)	215 (98.6%)	0.55
	Previous AIDS	566 (25.1%)	501 (24.5%)	65 (30.7%)	0.13
	Nadir CD4 cell count	198 (81-333)	200 (84-333)	173 (41-324)	0.019
	Current CD4 cell count	556 (409-721)	555 (409-718)	563 (403-778)	0.29
	HIV VL >200 cps/ml	150 (6.5%)	133 (6.4%)	17 (7.8%)	0.41
Comorbidities	Hepatitis B	139 (6.1%)	119 (5.8%)	20 (9.3%)	0.037
	Hepatitis C	24 (1.1%)	22 (1.1%)	2 (0.9%)	0.84
	BMI kg/m^2				0.031
	18.5-25	472 (20.5%)	442 (21.1%)	30 (13.8%)	
	25-30	821 (35.6%)	748 (35.8%)	73 (33.5%)	
	30-35	618 (26.8%)	552 (26.4%)	66 (30.3%)	
	35-40	258 (11.2%)	227 (10.9%)	31 (14.2%)	
	>40	139 (6.0%)	121 (5.8%)	18 (8.3%)	
	Hypertension	722 (31.3%)	584 (28.0%)	138 (63.3%)	<0.001
	Diabetes				
	Cardiovascular disease	90 (3.9%)	77 (3.7%)	13 (6.0%)	0.098
	Smoking status (never)	1,915 (83.0%)	1,726 (82.6%)	189 (86.7%)	0.010
	Renal impairment	96 (4.2%)	71 (3.4%)	25 (11.5%)	<0.001
	Proteinuria	485 (21.9%)	403 (20.1%)	82 (38.5%)	<0.001

MSM = men who have sex with men; ART = antiretroviral therapy; AIDS = acquired immunodeficiency syndrome; hepatitis B = HBV surface antigen positive; hepatitis C = anti-hepatitis C (IgG) antibody positive; BMI = body mass index; renal impairment = eGFR <60 mL/min/1.73m^2; proteinuria = uPCR >15 mg/mmol.

PREVALENCE OF DIABETES

- Obesity was more prevalent in females: 52 vs. 31%, p<0.001
- Diabetes was more prevalent in males: 12.8 vs. 7.4% p<0.001
- The prevalence of obesity and diabetes increased with age in both sexes (p<0.001)



FACTORS ASSOCIATED WITH DIABETES

Table 2: Univariate and multivariate associations with diabetes, stratified by sex

	FEMALE				MALE			
Exposure	Univariate		Multivariate*		Univariate		Multivariate*	
	OR [95% CI]	P value	OR [95% CI]	P value	OR [95% CI]	P value	OR [95% CI]	P value
Obesity	1.59 [1.05, 2.39]	0.02	1.19 [0.76, 1.85]	0.44	1.91 [1.27, 2.29]	0.002	1.40 [0.89, 2.20]	0.14
Age in years								
<40	1	0.0001	1	0.001	1	<0.001	1	0.01
40-50	4.56 [1.37, 15.2]		3.44 [0.99, 11.9]		12.3 [2.00, 117.0]		10.4 [1.38, 78.2]	
>50	15.6 [4.76, 51.5]		8.18 [2.30, 29.2]		29.5 [3.87, 224.4]		16.5 [2.24, 121.0]	
Current CD4 cell count	1.40 [1.00, 1.95]	0.05	1.52 [0.84, 2.77]	0.17	0.98 [0.71, 1.36]	0.93		
Hepatitis B	1.61 [0.75, 2.97]	0.75			1.69 [0.92, 3.09]	0.08	1.80 [0.94, 3.48]	0.08
Hypertension	4.57 [3.01, 6.92]	<0.001	2.49 [1.57, 3.95]	<0.001	3.97 [2.57, 6.11]	<0.001	2.26 [1.41, 3.60]	0.001
Renal impairment	5.29 [2.68, 10.4]	<0.001	2.46 [1.21, 4.99]	0.012	2.35 [1.18, 4.68]	0.01	0.75 [0.35, 1.63]	0.48
Proteinuria	1.60 [1.03, 2.48]	0.034	1.18 [0.73, 1.90]	0.50	3.84 [2.49, 5.91]	<0.001	3.02 [1.88, 4.76]	<0.001

*Adjusted for obesity, age, years HIV diagnosis, current CD4 cell count, hypertension, renal impairment and proteinuria

DISCUSSION

- Although obesity was more prevalent in African women, diabetes was more prevalent in African men. While both obesity and age (and hypertension, renal impairment, and proteinuria) were associated with diabetes in both female and males in univariable analyses, age remained significantly associated with diabetes, particularly amongst men, whereas obesity was no longer a significant risk factor in the adjusted analyses. Older African people with HIV should be regularly screened for diabetes.
- The limitations of this study include the cross-sectional nature of study (which precluded incorporation of the effects of antiretroviral medications), and the use of BMI (rather than measures of central obesity) to evaluate the relationship between obesity and diabetes mellitus.

CONCLUSIONS

- **Age was the strongest risk factor for diabetes** in this cohort of African people with well controlled HIV.
- Measures of central adiposity may be more useful predictors of diabetes, especially in African women with HIV.

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