

Weight gain and metabolic complications in a large prospective cohort of overweight and obese people with HIV

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PURPOSE

To describe the factors associated with weight gain and metabolic complications (diabetes mellitus, DM, and dyslipidaemia) in people with HIV (PWH) who are overweight or obese.

METHODS

This was a multicentre prospective study enrolling overweight and obese PWH in two observational cohorts: the Overweight and obese people with HIV (OBHIV) and Surveillance Cohort Long-Term Toxicity Antiretrovirals (SCOLTA) cohorts.

A total of 29 Italian centres participates to SCOLTA and/or OBHIV studies. People enrolled from 2014 onwards were considered eligible if they had at least one year of follow up and body mass index (BMI) >25 kg/m².

Exclusion criteria were pregnancy during follow up or GLP-1 (glucagon-like peptide-1) agonists use.

Monthly weight change was analysed using a linear model adjusted for potentially associated variables. Factors associated with incident diabetes and dyslipidaemia were estimated using a Cox proportional hazards model.

RESULTS (I)

1401 overweight (75%) or obese (25%) PWH were enrolled. The mean age was 51 years (SD $\pm$ 11.6) and 78.6% were male (Table 1).

TABLE 1: Baseline characteristics of 1401 study participants.

	BMI class				All	
	Overweight		Obese			
	N	%	N	%	N	%
Female	197	18.9	103	28.9	300	21.4
Caucasian	936	89.7	309	86.6	1245	88.9
Risk factor for HIV						
- IDU	136	13.0	45	12.6	181	12.9
- Sexual exposure	801	76.7	266	74.5	1067	76.2
- Other/Unknown	107	10.2	46	12.9	153	10.9
ART naïve	132	12.6	30	8.4	162	11.6
CDC Stage						
- A	570	54.6	208	58.3	778	55.5
- B	243	23.3	78	21.8	321	22.9
- C	200	19.2	58	16.2	258	18.4
- missing	31	3.0	13	3.6	44	3.1
Comorbidities at baseline						
- Diabetes	74	7.1	37	10.4	111	7.9
- Liver steatosis	38	3.6	19	5.3	57	4.1
- Hypertension	289	27.7	126	35.3	415	29.6
- Dyslipidaemia	665	63.7	240	67.2	905	64.6
ART at enrolment in the cohort						
- PI	54	5.2	8	2.2	62	4.4
- INSTI	926	88.7	289	81.0	1215	86.7
- NNRTI	385	36.9	142	39.8	527	37.6

ART: antiretroviral therapy; BMI: body mass index; INSTI: integrase inhibitors; IDU: intravenous drug use; NNRTI: non-nucleoside reverse transcriptase inhibitors; PI: protease inhibitors.

The mean weight change observed in this cohort was +0.03 kg/month in overweight (95%CI 0.0; 0.05) and -0.13 kg/month in obese PWH (95%CI -0.21; -0.04). There were no significant differences between males and females or between ART classes. After multivariable adjustment, which also considered the type of treatment, two variables were associated with the likelihood of significant weight loss: ART experience (-0.09 kg/month SE 0.03, $p=0.0092$) and obesity at baseline (-0.09 kg/month SE 0.04, $p=0.0367$). No factor was associated with weight gain (Table 2 and Figures 1-4).

RESULTS (II)

The incidence of DM was 2.06/100 PYFU and that of dyslipidaemia was 3.12/100 PYFU.

Incident diabetes was more probable in PWH who were obese (aHR 2.4, 95%CI 1.4;3.9), older (aHR 1.04 per year, 95%CI 1.02;1.07) with steatosis (aHR 2.6, 95%CI 1.01;6.6) and detectable HIV RNA (aHR 3.3 for HIV RNA 50-200 copies/mL, 95%CI 1.5-7.4 and aHR 3.7 for HIV RNA >200 copies/mL, 95%CI 1.3-10.5). People with a shorter duration of exposure to INSTI appeared to be at higher risk (aHR 5.5 for exposure below the median, 95%CI 1.9-15.7), as shown in table 3.

No risk factor was instead associated with incident dyslipidaemia.

TABLE 2: Weight changes and associated factors in the study population

Variable	Univariate analysis			Multivariate analysis			Change from baseline
	Mean	SE	P	Adjusted mean	SE	Adjusted P	
Age <50 years	0.035	0.020	0.004	-0.037	0.040	0.11	0.34
Age ≥ 50 years	-0.049	0.021		-0.087	0.038		0.02
Female	-0.058	0.039	0.09	-0.087	0.043	0.15	0.04
Male	0.001	0.015		-0.037	0.035		0.29
Overweight	0.028	0.013	<0.0001	0.007	0.036	<0.0001	0.84
Obesity	-0.126	0.042	1	-0.131	0.041		0.0015
Rik factor for HIV acquisition	0.018	0.015	0.001	0.014	0.032	0.003	0.66
Sexual IDU	-0.092	0.038		-0.077	0.050		0.12
Other/unknown	-0.124	0.060		-0.123	0.052		0.02
Steatosis	-0.009	0.094	0.97				
No	-0.012	0.014					
Diabetes	-0.059	0.035	0.33				
No	-0.007	0.015					
Hypertension	-0.058	0.030	0.038	-0.071	0.042	0.58	0.09
No	0.008	0.016		-0.053	0.036		0.14
Dyslipidaemia	-0.024	0.018	0.25				
No	0.011	0.023					
CDC stage							
A	-0.027	0.020	0.51				
B	-0.007	0.031					
C	0.016	0.024					
ART Naïve	0.159	0.041	<0.0001	0.001	0.052	0.007	0.98
ART experienced	-0.034	0.015	1	-0.125	0.029		<0.0001
HIV RNA*							
Undetectable	-0.008	0.015	0.57				
Detectable	-0.029	0.042					
Ongoing statin*	0.010	0.020	0.35				
No	-0.020	0.018					
ART duration (exp.PWH)							
$<$ median (<10.2 years)	-0.020	0.021	0.31				
$\geq$ median (≥ 10.2 years)	-0.051	0.022					
On treatment with TAF at baseline	0.002	0.027	0.46				
No	-0.020	0.017					
On NNRTI at baseline	-0.060	0.026	0.0097	-0.095	0.040	0.05	0.019
No	0.017	0.017		-0.029	0.038		0.44
Years of NNRTI (exp.PWH) experienced, not exposed	-0.025	0.026	0.60				
$<$ median (<68 months)	-0.012	0.020					
$\geq$ median (≥ 68 months)	-0.049	0.020					
On PI at baseline	0.067	0.044	0.24				
No	-0.015	0.015					
Years of PI (exp.PWH) experienced, not exposed	-0.032	0.020	0.75				
$<$ median (<63 months)	-0.008	0.037					
$\geq$ median (≥ 63 months)	-0.064	0.029					
On INSTI at baseline	-0.004	0.016	0.16	-0.072	0.034	0.68	0.038
No	-0.063	0.039		-0.052	0.049		0.29
Years of INSTI (exp.PWH) experienced, not exposed	-0.025	0.035	0.15	-0.107	0.038	0.25	0.005
$<$ median (<42 months)	-0.029	0.022		-0.133	0.040		0.001
$\geq$ median (≥ 42 months)	-0.046	0.025		-0.135	0.041		0.001

TABLE 3: Factors associated with incident diabetes in 1338 overweight and obese people with HIV without diabetes at baseline.

Variable	Univariable			Multivariable analysis		
	HR	95% CI	P value	Adjusted hazard ratio	95% CI	P value
Age (by 1 year)	1.04	1.02-1.07	0.0002	1.04	1.01-1.06	0.0012
Sex (ref. M)	1.14	0.65-2.01	0.6370			
Obesity (ref. overweight)	2.46	1.52-3.99	0.0002	2.36	1.39-4.00	0.0015
Rik factor for HIV acquisition (ref. sexual IDU)	1.54	0.83-2.86	0.1691			
Other/unknown	1.59	0.82-3.07	0.1710			
steatosis	0.44	0.17-1.10	0.0790			
hypertension	0.61	0.37-0.99	0.0457			
dyslipidemia	0.48	0.30-0.78	0.0031			
CDC stage (ref. A)						
B	0.94	0.52-1.72	0.8434			
C	1.31	0.73-2.37	0.3624			
HIV RNA (ref. <50 copies/mL)						
50-199 copies/mL	3.80	1.73-8.36	0.0009	4.25	1.91-9.45	0.0004
>200 copies/mL	2.71	0.98-7.48	0.0542	2.76	0.85-8.93	0.0903
Ongoing statin (ref. no)	2.40	1.40-4.10	0.0014	1.43	0.83-2.46	0.1958
Weight gain from baseline (for each 1 kg increase)	0.99	0.96-1.02	0.5686			
ART duration (by 1 year)	1.01	0.99-1.04	0.3076			
Treatment with TAF	1.14	0.70-1.85	0.5992			
Years of NNRTI	1.002	1.00-1.005	0.0760			
Treatment with NNRTI	1.29	0.78-2.12	0.3171			
Years of NNRTI	1.004	1.001-1.008	0.0226			
Treatment with PI	1.65	0.66-4.11	0.2836			
Years of PI	1.003	0.99-1.006	0.1090			
Treatment with INSTI ref. Never exposed	0.61	0.33-1.11	0.1073			
Years of INSTI	0.99	0.98-1.008	0.7227			
Cohort (ref. SCOLTA)						
OBHIV	1.82	0.97-3.42	0.0611			

CONCLUSIONS

We observed modest weight changes in overweight and obese people living with HIV (PWH). The type of antiretroviral treatment was not associated with weight gain or loss, or with the incidence of DM. Future studies focusing on obese people could clarify whether distinctive risk factors could be identified in this specific group.

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