

Weight gain or "return to health"? - Changes in body weight in aging people living with HIV compared with the general population from the German Ruhr-area over 5 years

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Background

The prevalence of obesity has increased worldwide within the last decades^{1,2}, including for people living with HIV (PLHIV)^{3,4}. It was observed, that for PLHIV under antiretroviral therapy (ART) there is a higher risk for weight gain, especially with the use of specific Integrase-Inhibitors or Tenofovir Alafenamid⁴. This analysis compared weight changes in people living with HIV (PLHIV) and the general population.

Methods

The HIV HEART Aging Study (HIVH) is a prospective cohort study to assess cardiovascular risk in PLHIV in Germany. Descriptive statistics for baseline and 5-year-follow-up in HIVH and the population-based

Heinz Nixdorf Recall Study (HNR) (inclusion criteria: age ≥ 45 years), both recruiting in the same German Ruhr-area since 2004, were compared. The cohorts were matched 1:2 by age and sex. The shift between BMI groups during the observation period in HIVH and HNR was visualized. Linear regression models were calculated to assess the effect of HIV on weight, BMI, and waist-hip-ratio at baseline and percentage change after 5 years of follow-up.

Results

The matched HIVH and HNR participants (N=389 and N=778, respectively; 13% females) had a mean age of 53.6 \pm 6.3 years at baseline. 83% of PLHIV took

antiretroviral therapy at baseline and 99% after 5 years. Baseline and 99% after 5 years. Baseline characteristics are shown in table 1. The regression models (table 2.) showed 8kg (95%-CI: 6.17-9.63) lower mean baseline weight in PLHIV compared to HNR controls. Accordingly, we observed 2.92 units (95%-CI: 2.44-3.41) lower baseline BMI in PLHIV. After 5 years, BMI and weight gain were 0.4% higher in PLHIV. The shift from normal to overweight BMI was especially prominent in PLHIV (figure 1). At baseline, the waist-hip-ratio was 0.04 (95%-CI: 0.02-0.05) units higher for PLHIV compared to HNR-controls. After 5 years, PLHIV gained 1.6% (95%-CI: 0.46-2.78) more in waist-hip-ratio.

Conclusions

While PLHIV showed a lower weight and BMI than the general population at baseline, relative weight and BMI gain after 5 years was slightly higher in PLHIV. A stronger effect was observed for waist-hip-ratio. We observed, that PLHIV approach the regular population regarding weight gain over time. The proportion of overweight and obesity in PLHIV was still much lower compared to the general population, suggesting that the BMI shift among PLHIV reflected "coming-back-to-normal" effects of the ART.

Discussion

The general population in the German Ruhr-area has high rates of overweight and obese BMI which is associated with health issues like diabetes mellitus and cardiovascular diseases. The BMI harmonization as a result of the weight gain in PLHIV might present a "coming back to normal" but does not inevitably mean a "return to health".

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References

- WHO (2016): Centers for Disease Control and Prevention. Obesity and overweight. <https://www.cdc.gov/nchs/fastats/obesity-overweight.htm>
- Finucane MM, Stevens GA, Cowan MJ, et al. (2011): National, regional, and global trends in body-mass index since 1980: systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9.1 million participants. *The Lancet*;377:557-67.
- Koethe JR, Jenkins CA, Lau B, et al. (2016): Rising obesity prevalence and weight gain among adults starting antiretroviral therapy in the United States and Canada. *AIDS research and human retroviruses* 2016;32:50-8.
- Bailin SS, Gabriel CL, Wanjalla CN, Koethe JR. Obesity and Weight Gain in Persons with HIV. *Curr HIV/AIDS Rep.* 2020 Apr;17(2):138-150

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Table 1. Baseline and 5 year follow-up characteristics of PLHIV from HIVH vs. the general population from HNR

	HIVH at Baseline		HNR at Baseline		p-value	HIVH at 5-year-follow-up		HNR at 5-year-follow-up		p-value	
	N	n(%) / MEAN \pm SD	N	n(%) / MEAN \pm SD		N	n(%) / MEAN \pm SD	N	n(%) / MEAN \pm SD		
Baseline											
sex	female	389	51 (13.1 %)	778	102 (13.1 %)	1	389	51 (13.1 %)	778	102 (13.1 %)	1
age	[years]	389	53.6 \pm 6.3	778	53.6 \pm 6.3	1	389	58.8 \pm 6.4	778	58.8 \pm 6.3	0.9766
weight	[kg]	389	76.2 \pm 13.3	778	84.1 \pm 14.6	<.0001	389	77.6 \pm 14.3	778	85.3 \pm 15.1	<.0001
BMI	[kg/m ²]	389	24.7 \pm 3.7	778	27.6 \pm 4.1	<.0001	389	25.2 \pm 4.3	778	28.1 \pm 4.3	<.0001
waist circumference	[cm]	158	92.0 \pm 11.7	777	96.6 \pm 12.3	<.0001	354	94.2 \pm 10.9	778	98.9 \pm 12.9	<.0001
hip circumference	[cm]	158	93.3 \pm 9.9	778	101.4 \pm 8.4	<.0001	354	93.5 \pm 10.2	778	101.8 \pm 8.4	<.0001
waist-hip ratio		158	0.99 \pm 0.07	777	0.95 \pm 0.08	<.0001	354	1.01 \pm 0.07	778	0.97 \pm 0.09	<.0001
5-Year Follow Up											
rel. weight diff. / 5 years	%						389	1.82 \pm 8.09	778	1.44 \pm 6.18	0.3695
rel. BMI diff. / 5 years	%						389	2.17 \pm 8.96	778	1.78 \pm 6.28	0.3891
rel. waist-hip-ratio diff. / 5 years	%						154	3.62 \pm 10.57	777	2.01 \pm 5.64	0.0064

Table 2. Linear Regression Models of PLHIV from HIVH vs. the general population from HNR

Linear Regression Models PLHIV vs. HNR	Parameter Estimate	95% Confidence Limits		Pr > t
weight at baseline [kg]	-7.90	-9.63	-6.17	<0.0001
BMI at baseline	-2.92	-3.41	-2.44	<0.0001
Waist-Hip-Ratio	0.04	0.02	0.05	<0.0001
weight difference after 5 years [%]	0.38	-0.45	1.22	0.90
BMI difference after 5 years [%]	0.39	-0.5	1.28	0.39
waist-hip-ratio difference after 5 years [%]	1.61	0.46	2.78	0.0064

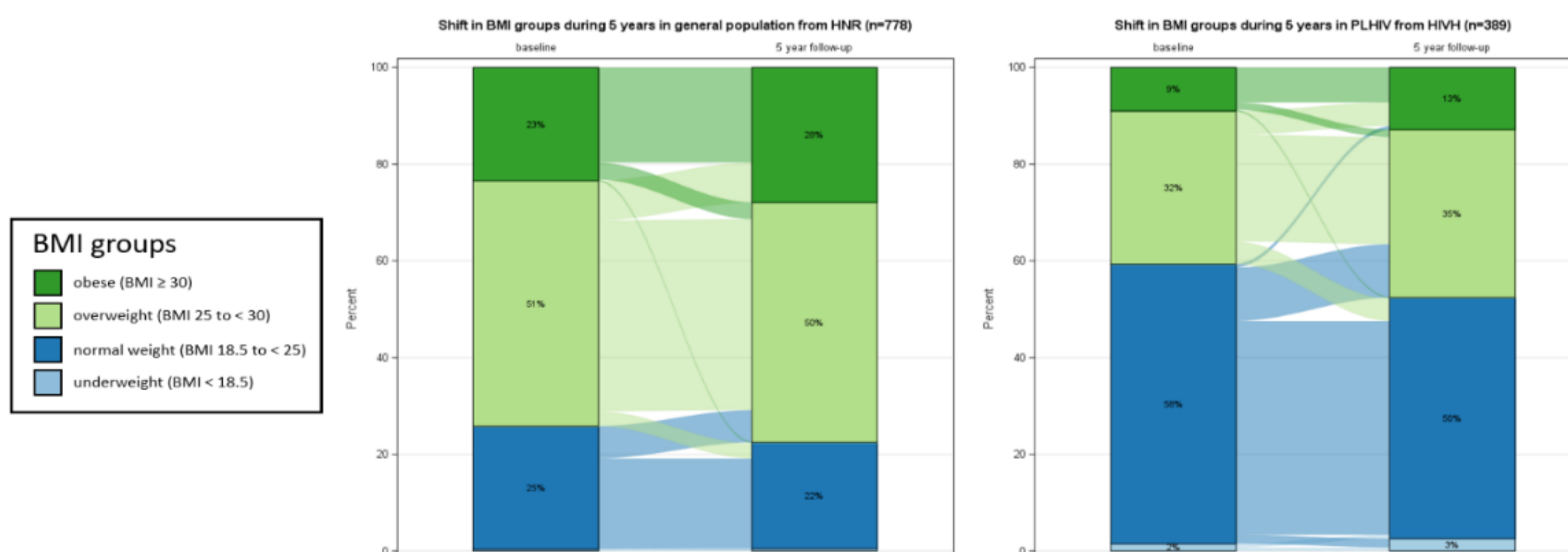


Figure 1. Shift in BMI-Groups within 5 years in HIV HEART Aging Cohort (HIVH) and Heinz Nixdorf recall cohort (HNR) (Exclusion criteria: age < 45 years, active malignancy except Kaposi's Sarcoma)