ABSTRACT 1356

In Sub-Saharan Africa, the differential impact of maternal HIV infection and/or food insecurity on the pattern of weight gain among pregnant women is unknown. To fill this gap, data on 402 pregnant women (33% HIV+ & participating in antiretroviral treatment) enrolled in a perinatal cohort study at Gulu Regional Referral Hospital in northern Uganda were analyzed. We used mixed effects models with gestational age at each assessment as the time variable to determine the influence of HIV and/or food insecurity on the rate of, and cumulative, weight gain during pregnancy. Between 10 and 42 weeks of gestation, the unadjusted rate of weight gain among HIV-uninfected women was 308.2±10.6g/week compared to 238.3 ± 14.9g/week for HIV-infected women (mean±s.e; p<0.001). After adjusting for maternal age and height, HIV infection, but not food insecurity, was associated with weight gain in pregnancy. The adjusted rate of weight gain was 51g/week lower among HIV+ women than HIV- women (p=0.01). Weight gain rates among HIV+ women were lowest (-85g/week, p=0.008) during weeks 33 to 42 of gestation. After controlling for women's duration of stay in the study, HIV+ women gained about 1.09kg less weight than HIV- women (p<0.001). To develop and target interventions for improving weight gain among pregnant women of mixed HIV status, there is need to understand the mechanisms by which HIV-infected pregnant women gain less weight than HIV-uninfected women.

Maternal HIV infection, but not food insecurity access score, predicts the rate of weight change in pregnant women attending antenatal services in northern Uganda

Barnabas K. Natamba[1,2], Sera L. Young[1], Elizabeth M. Widen[3], Shibani Ghosh[4], Patsy Brannon[1], Jeffrey K. Griffiths[4,5], & Saurabh Mehta[1]

[1]Division of Nutritional Sciences, Cornell University, Ithaca, NY; [2]Department of Public Health, Gulu University, Gulu, Uganda; [3]Mailman School of Public Health, Columbia University, New York, NY. [4]Friedman School of Nutrition Science & Policy, Tufts University, Boston, MA; [5]Department of Public Health & Community Medicine, Tufts University, Boston, MA.

INTRODUCTION

Changes in maternal weight and mid upper arm circumference (MUAC) during pregnancy are important predictors of birth outcomes including infant weight at birth, term delivery, and infant survival in the first year.

Both weight and MUAC changes during pregnancy depend on maternal nutrition before and during pregnancy. Nutrition, particularly energy intake, is an important factor that needs to be considered when assessing modifiable predictors of weight and MUAC changes in pregnancy.

In resource poor settings, measuring actual energy intake during pregnancy is problematic due to lack of good and validated metrics. Thus, we are usually constrained to using metrics of perceived rather than actual nutrient/energy intake.

Our goal was to examine separately the ability of 3 different but related metrics of food insufficiency in predicting changes in weight and MUAC in a cohort of HIV–infected and –uninfected Ugandan pregnant women.

METHODS

403 pregnant women (33%HIV infected & on antiretroviral treatment) were recruited from the antenatal clinic of Gulu Regional Referral Hospital.

Exposure to food insufficiency in the current pregnancy was measured using 1) a locally generated calendar of seasons, 2) the individually focused food insecurity access scale (IFIAS), and (3) the women's dietary diversity scores (WDDS).

Seasonal food insufficiency was defined as a 3-category ordinal variable with the reference category indicating never exposed, the second category corresponded to being exposed for 1, or 2 months, and the third category captured those with 3 or 4 months of exposure to seasonal food insufficiency.

Anthropometric measures (weight, height, MUAC) were taken by trained research assistants and following standardized protocols. Covariates were assessed using a detailed structured questionnaire and laboratory tests for malaria, syphilis, and HIV were performed as per the Ugandan Ministry of Health recommendations.

We defined the rate of weight or MUAC change as weight or MUAC at the last available visit minus weight or MUAC at enrollment visit (in kg or cm) divided by the time difference (in weeks) between the two visits.

We fit bivariate and multivariate linear regression models to determine separately which of the three metrics of food insufficiency predicted the rate of weight or MUAC change.

RESULTS

Table 1. Baseline characteristics of pregnant women enrolled in the study (n=403)

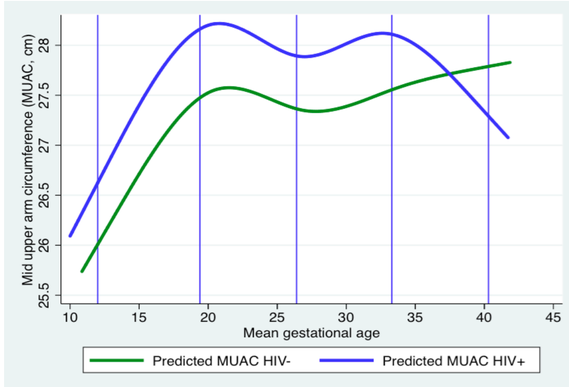
Variable	HIV+ (n=133)	HIV- (n=270)
Gestation age, weeks	18.7±4.1$	19.7±3.6*
Height, cm	163.4±5.7	163.0±6.2
Weight, kg	61.4±8.0	60.6±8.8
MUAC, cm	27.7±2.6	27.3±2.9
Duration of exposure to seasonal food insufficiency		
Never (0 months)	14 (10.5%)$$	45 (16.7%)
Mild (1-2 months)	39 (29.3%)	83 (30.7%)
Moderate (3-4months)	80 (60.2%)	142 (52.6%)
IFIAS score	11.4±5.8	8.7±5.5***
WDDS score	3.8±1.3	4.2±1.2**
Hours spent working per day	10.9±3.2	11.3±3.0

*p<0.05; **p<0.005; ***p<0.001
$ Mean±S.D.; $$ n(%n)

RESULTS CONTINUED

Figure 1. Spline curves depicting the trajectory of MUAC and weight change from 10 to 42 weeks of gestation by maternal HIV status

a) MUAC change by gestation age



b) Weight change by gestation age

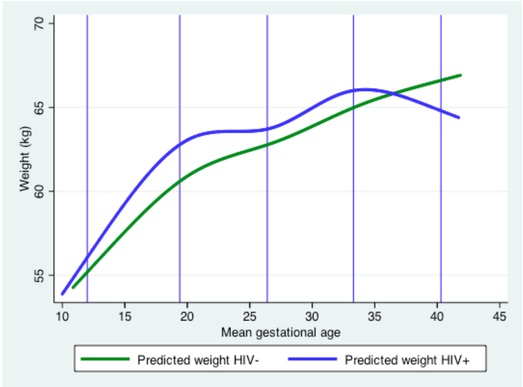


Table 2. Predictors of the rate of gestational weight change among participants with 2 or more follow-up visits (n=379)

Variable	Unadjusted (p<0.20) Effect (95%CI) kg/week	Adjusted (p<0.05) Effect (95%CI) kg/week
Age, years	-0.006 (-0.010; -0.003)***	-0.006 (-0.009; -0.002)**
Height	0.003(-0.0003; -0.006)	0.004 (0.001; 0.007)*
Duration of seasonal food insufficiency		
Never (0months)	Reference	Reference
Mild (1-2months)	-0.067 (- 0.127; -0.007)*	-0.060 (-0.118; -0.003)*
Moderate (3-4months)	- 0.074 (-0.130; -0.018)*	-0.058 (-0.112; -0.004)*
HIV status	-0.076 (-0.113; -0.038)***	-0.063 (-0.100; -0.025)**
Parity	-0.016 (-0.027; -0.004)*	
IFIAS score	-0.003 (-0.006; 0.0003)	
Time spent working per day	-0.004 (-0.0103; 0.002)	
Only primary or less education	-0.035 (-0.071; 0.001)	
Malaria	0.068 (-0.004; 0.0140)	
Syphilis	-0.065 (-0.137; 0.007)	
Ever been abducted	-0.055 (-0.105; -0.004)*	

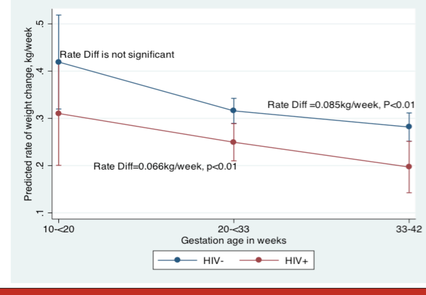
*p<0.05; **p<0.005; ***p<0.001

Table 3. Predictors of the rate of MUAC change during pregnancy among participants with 2 or more follow-up visits (n=379)

Variable	Unadjusted (p<0.20) Effect (95%CI), cm/week	Adjusted (p<0.05) Effect (95%CI), cm/week
Age, years	-0.002 (-0.004; -0.0005)*	-0.002 (-0.004; -0.0001)*
Duration of exposure to seasonal food insufficiency		
Never (0 months)	Reference	Reference
Mild (1-2 months)	-0.033 (- 0.065; -0.001)*	-0.032 (-0.064; -0.001)*
Moderate (3-4months)	-0.086 (-0.115; -0.056)***	-0.084 (-0.113; -0.054)***
WDDS Score	0.007 (-0.001; 0.015)	
CES-D Score	-0.001 (-0.001; 0.0001)	
Social support score	0.003 (0.001; 0.006)*	
Only primary or less education	-0.017 (-0.037; 0.003)	
STD history	-0.029 (-0.059; 0.001)	
HIV status	-0.021 (-0.042; 0.0002)	
Ever been abducted	-0.024 (-0.052; -0.003)	

*p<0.05; **p<0.005; ***p<0.001

Figure 2. Predicted rate of weight gain by maternal HIV infection and gestation age category



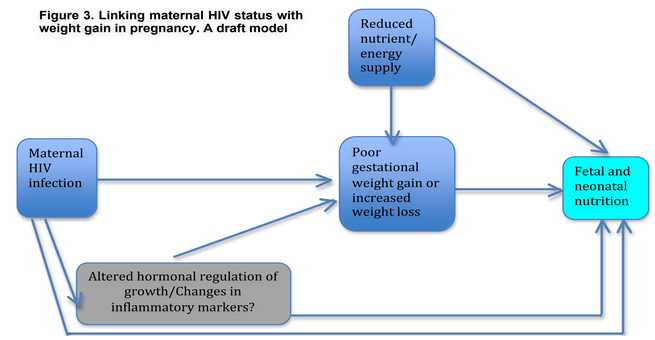
SUMMARY & DISCUSSION

Exposure to seasonal food insufficiency, unlike the IFIAS or WDDS, was the sole predictor of both weight and MUAC changes in pregnant women of mixed HIV status in northern Uganda. HIV infection status, however, predicted the rate of weight change but not changes in MUAC during pregnancy.

Our results suggest that the IFIAS and WDDS, unlike seasonal food insufficiency, are not good markers of nutrient/energy intake. Better metrics for nutrient intake that are based on comprehensive nutrition composition datasets for Uganda need to be developed.

Why HIV affects the rate at weight change but not changes in MUAC in pregnancy is unknown. Possibly, weight and MUAC changes in pregnancy reflect different maternal and fetal compartments that respond differently to HIV infection status but this needs to be looked at in future studies.

Figure 3. Linking maternal HIV status with weight gain in pregnancy. A draft model



CONCLUSIONS

Seasonal food insufficiency was associated with both poor weight and MUAC change but HIV infection was only associated with poor weight change. Neither IFIAS or WDDS scores were associated with weight or MUAC changes in pregnancy.

Mechanisms by which HIV-infected women attain poorer rates of weight gain compared to -uninfected women need further study.

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