BACKGROUND:

Bacterial vaginosis (BV), a disruption of the normal vaginal flora, has been associated with a 60% increased risk of HIV-1 acquisition in women and higher concentration of HIV-1 RNA in the genital tract of HIV-1-infected women. However, whether BV, which is present in up to half of African HIV-1-infected women, is associated with an increase in HIV-1 transmission to male partners has not been assessed in previous studies.

METHODS AND FINDINGS:

We assessed the association between BV on female-to-male HIV-1 transmission risk in a prospective study of 2,236 HIV-1-seropositive women and their HIV-1 uninfected male partners from seven African countries from a randomized placebo-controlled trial that enrolled heterosexual African adults who were seropositive for both HIV-1 and herpes simplex virus (HSV)-2, and their HIV-1-seronegative partners. Participants were followed for up to 24 months; every three months, vaginal swabs were obtained from female partners for Gram stain and male partners were tested for HIV-1. BV and normal vaginal flora were defined as a Nugent score of 7-10 and 0-3, respectively. To reduce misclassification, HIV-1 sequence analysis of viruses from seroconverters and their partners was performed to determine linkage of HIV-1 transmissions. Overall, 50 incident HIV-1 infections occurred in men in which the HIV-1-infected female partner had an evaluable vaginal Gram stain. HIV-1 incidence in men whose HIV-1-infected female partners had BV was 2.91 versus 0.76 per 100 person-years in men whose female partners had normal vaginal flora (hazard ratio 3.62, 95% CI 1.74-7.52). After controlling for sociodemographic factors, sexual behavior, male circumcision, sexually transmitted infections, pregnancy, and plasma HIV-1 RNA levels in female partners, BV was associated with a greater than 3-fold increased risk of female-to-male HIV-1 transmission (adjusted hazard ratio 3.17, 95% CI 1.37-7.33).

CONCLUSIONS:

This study identified an association between BV and increased risk of HIV-1 transmission to male partners. Several limitations may affect the generalizability of our results including: all participants underwent couples HIV counseling and testing and enrolled in an HIV-1 prevention
trial, and index participants had a baseline CD4 count ≥ 250 cells/mm³ and were HSV-2 seropositive. Given the high prevalence of BV and the association of BV with increased risk of both female HIV-1 acquisition and transmission found in our study, if this association proves to be causal, BV could be responsible for a substantial proportion of new HIV-1 infections in Africa. Normalization of vaginal flora in HIV-1-infected women could mitigate female-to-male HIV-1 transmission. Trial Registration: ClinicalTrials.com NCT00194519.