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The Impact of Alcohol Use on HIV/STI Intervention Efficacy in Predicting Sexually Transmitted Infections Among Young African-American Women

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Abstract

The impact of alcohol use on the efficacy of an HIV/STI intervention designed for young African-American women in predicting STIs was examined. Eight hundred forty-eight African-American women, 18–29 years, were randomly assigned to either the HIV/STI intervention or a control condition. Participants were assessed on alcohol use and provided two vaginal swab specimens for STI testing. Women in the intervention who consumed alcohol were less likely to test STI-positive than women in the control and abstainers (AOR = 2.47, 95 % CI = 1.01–6.22). STI risk factors may vary across different populations. Further research on heavy drinking and HIV intervention efficacy is needed.

Keywords

Alcohol; Sexually transmitted infections; African-American; Women; HIV; Intervention

Introduction

African-Americans are disproportionately affected by HIV and other sexually transmitted infections (STIs). According to the Centers for Disease Control and Prevention (CDC), African-Americans account for approximately half of Chlamydia and syphilis cases and 75 % of Gonorrhea cases [1]. Therefore, it is pertinent to examine and understand factors associated with STIs among African-American women in order to decrease the risk of HIV/STIs in this population. One such risk factor is alcohol use. Prevalence of alcohol abuse or disorders is lower among African-American women than white women, but consequences have been found to be more severe among African-American women [2].

Previous research has indicated that alcohol use is associated with HIV/STI risk behavior and STIs among young African-American women [3, 4]. In an HIV intervention that was found to be effective among a sample of predominantly African-American men and women, frequency of alcohol use was a predictor of unprotected sex among the participants in the intervention condition but not for participants who consumed alcohol less frequently. This suggests that alcohol use may negatively impact HIV intervention efficacy in reducing high-risk sexual behavior [5].

Although the relationship between alcohol and HIV/STI risk behavior has been well established [3, 4, 6], there is less literature on the role of alcohol use at non-abuse levels on STI acquisition and infection among African-American women. However, one study has indicated that non-abuse levels of alcohol are associated with sexual risk behavior and STI infection among this sample [4]. Since African-American women are disproportionately affected by HIV/STI epidemics in the Deep South [7] and previous literature has indicated that alcohol is associated with sexual risk behavior and can impact HIV intervention efficacy, evaluating HIV/STI interventions further for this population is a public health priority. Therefore, the present study examined the impact of alcohol use on the efficacy of an HIV/STI prevention intervention [8] designed for young African-American women in predicting an STI infection. Based on previous research, it was expected that the HIV/STI intervention would be effective at reducing STI acquisition over 12-month follow-up among women who abstained from alcohol use but not among women who consumed alcohol. To our knowledge, this is one of the first studies to examine alcohol use as a moderator of HIV/STI intervention efficacy among a sample of young African-American women.

Methods

Participants were part of a larger HIV intervention trial tailored for African-American women [8]. From October 2002 through March 2006, 9,393 members from three Kaiser Permanente Centers having the greatest number of African-Americans in Atlanta, GA, were randomly selected using the Kaiser subscriber database. Eligibility criteria included being an African-American woman, 18–29 years, unmarried, sexually active in the prior 6 months, and providing written and verbal informed consent. Of these members, 979 (21.8 %) met all eligibility criteria. All 979 eligible women were invited to participate and 848 (86.6 %) completed baseline assessments and were randomized to study conditions. Of the 605 participants allocated to the HIV intervention condition, 441 (72.9 %) completed the 6-

month assessment and 452 (74.7 %) completed the 12-month assessment. Of the 243 participants allocated to the comparison, 194 (79.8 %) completed the 6-month assessment and 183 (75.3 %) completed the 12-month assessment. No differences were observed between conditions with participants retained and lost to follow-up at the 6-month assessment (27.1 % [$n = 441$] versus 20.2 % [$n = 194$]) or 12-month assessment (25.3 % [$n = 452$] versus 24.7 % [$n = 183$]). Participants were compensated for travel and child care to attend each intervention session and complete behavioral and biological assessments. The Emory University Institutional Review Board (IRB) approved the study protocol prior to implementation.

Intervention Methods [8]

The HIV/STI intervention consisted of two 4 h group sessions, with an average of 10 participants per session, and was facilitated by two trained African-American female health educators. The general health promotion (control) condition consisted of one 4 h group session that emphasized nutrition and exercise. The HIV intervention was informed by CDC-defined evidence based HIV interventions developed by the study team and applied complementary theoretical frameworks to guide program activities. Social cognitive theory informed the HIV intervention content by seeking to enhance participants' attitudes and skills in abstaining from sexual intercourse, practicing low-risk sexual behaviors (i.e. intercourse), avoiding untreated STIs, using condoms consistently, and refraining from having multiple and concurrent sexual partners. Content regarding avoiding concurrency emphasized valuing one's body, perceiving one's body as a temple (a culturally appropriate connotation), informing participants of the heightened risk of STIs, including HIV, when women engage in concurrency, and discussing partner selection strategies that encouraged monogamy (for both the female participant and their male sexual partners).

HIV intervention content also was informed by the theory of gender and power, which examines economic forces, power imbalances, gender-related factors, and biological influences affecting women's HIV risk. Theoretically informed content sought to enhance women's awareness of power imbalances, such as relationships that threaten their safety, and by teaching women about economic forces which may reduce their self-sufficiency, such as dating male partners who desire pregnancy. The theory informed intervention content by educating participants' about gender-related HIV prevention strategies, such as, refraining from vaginal douching and enhancing sexual communication, and by educating women about biological influences which could reduce HIV risk, such as encouraging participants to have their male sexual partners seek STI testing and treatment if necessary. HIV prevention strategies were equally emphasized and the benefits of adopting multiple strategies were discussed.

Measures

Alcohol use was assessed by asking participants the frequency with which they consumed alcohol during the past 30 days at baseline. Alcohol use was categorized as women who consumed alcohol versus women who abstained from alcohol.

Incident STI infection was defined as a positive laboratory test result for a new chlamydia, gonorrhea, or trichomonas infection. Participants provided two vaginal swabs at each of the three assessments. One swab was evaluated for *Neisseria gonorrhoeae* (GC) and *Chlamydia trachomatis* (CT) using the Becton–Dickinson ProbeTec ET *Chlamydia trachomatis* and *Neisseria gonorrhoeae* Amplified DNA Assay (Sparks, MD). A second vaginal swab was tested for *Trichomonas vaginalis* (TV) using Taq-Man polymerase chain reaction (PCR). The Caliendo Laboratory developed and validated this test which employs a homogenous kinetic PCR to amplify and detect a conserved part of a repeated DNA fragment of TV. All assays were conducted at the Emory University, Department of Pathology, Caliendo Research Laboratory. Women testing positive were provided directly observable singledose treatment, received risk-reduction counseling per CDC recommendations, and were encouraged to refer sex partners for treatment. The county health department was notified of reportable STIs.

Data Analysis Plan

On average, this sample of women reported low levels of alcohol use and many reported abstaining from alcohol. Therefore, alcohol use was dichotomized into women who consumed alcohol versus those who abstained from alcohol during the past 30 days at baseline. Illicit drug use (i.e., yes/no report of using one or more of the following substances: marijuana, amphetamines, heroin, cocaine, crack, ecstasy) and baseline outcomes measures were included as covariates.

Descriptive statistics were first conducted on sociodemographics, alcohol use, and STIs. Given the binomial distribution, binary logistic generalized estimating equation (GEE) was conducted to control for repeated within-subject measurements and allow for a number of observations on participants longitudinally. GEE models examined the interaction effect between HIV/STI intervention group and alcohol use at baseline on STIs over the 12-month follow-up period. Pairwise comparisons were conducted to help interpret the significant interactions.

Results

Participants' average age was 22.04 (SD = 3.61) years and the majority of women reported completing 1–4 years of college (59.3 %). At baseline, 340 (40.1 %) women reported abstaining from alcohol use over the past 30 days, whereas 508 (59.9 %) women reported consuming alcohol. Among women who reported alcohol consumption, the average number of days was 4.34 (SD = 4.70) days during the past 30 days, and the average number of drinks in a typical sitting was 1.66 (SD = 0.95). The frequency of alcohol use also did not significantly differ across baseline (59.9 %), 6 months follow-up (61.6 %), and 12 months follow-up (57.6 %). Finally, 10.2 % of women were STI-positive over the 12-month follow-up period.

After controlling for covariates, the GEE model indicated that there was a significant interaction effect between alcohol use and HIV/STI intervention group on testing positive for an STI(s) (AOR = 2.47, 95 % CI = 1.01–6.22, $p = 0.05$). As shown in Fig. 1, among women who consumed alcohol, women in the intervention condition were less likely to test

positive for any STI than women in the control condition (6 % vs. 11.6 %, $p = 0.05$). Additionally, women in the intervention condition who consumed alcohol were less likely to test positive for any STI than women who did not consume alcohol and were in the control (6 vs. 9.2 %, $p = 0.05$) and intervention (6 vs. 10.3 %, $p = 0.05$) conditions. There were no significant differences in testing STI-positive among women who did not consume alcohol.

Discussion

This is one of the first studies to examine the impact of alcohol use on HIV/STI intervention efficacy among young adult African-American women. Interestingly and contrary to expectations, women in the intervention who consumed alcohol were less likely to test STI-positive than those who did not consume alcohol, regardless of intervention condition. A previous study from this sample indicated that alcohol use significantly predicted condom use and STI infection [4]. However, it seems an HIV/STI intervention that does not specifically discuss alcohol use may still have an impact on STI acquisition and infection among women consuming alcohol at non-abuse levels.

Previous research has shown that alcohol use has been a significant predictor of unprotected sex, even for individuals receiving an intervention [5]. In the current study, the participant characteristics were different, as the sample only included African-American women who reported a lower frequency of alcohol consumption and on average, at non-abuse levels. Since a previous study indicated alcohol use was associated with an STI infection among this sample, it is possible that the intervention may have specifically had an impact on women who consumed alcohol and participated in the intervention. The women who participated in the intervention may have developed appropriate behavioral skills, which also affected their sexual decision making leading to safer sexual behaviors. These young women may have changed their behavior, avoided certain sexual situations that involved alcohol, and made changes to their sexual network that reduced their likelihood of contracting an STI.

Unexpectedly, among women receiving the intervention, those who did not consume alcohol were more likely to be STI-positive at 12-month follow-up than those who did consume alcohol. The counter-intuitive finding suggests that there may be a reporting bias and reliance on self-reported behavior may not provide the most accurate information. Some women may have been misclassified as abstainers based on their self-report when in fact that may not be the case. Emerging evidence suggests that self-report of sensitive behaviors is prone to reporting errors for diverse reasons, including encoding, storage and retrieval errors, and social desirability [9]. Even though self-report remains necessary, other objective and quantifiable non-disease biological markers may be needed to validate self-report of behaviors.

Although not examined in this study, there are potentially other factors, such as violence, racial disparities, and other individual and partner-related factors that may moderate the relationship between intervention condition and STI acquisition and infection in addition to alcohol use among young African-American women [10–12]. On the other hand, it also is possible that the interaction between intervention condition and alcohol in itself did not lead

to safer sexual behavior. Instead, non-abuse levels of alcohol consumption may serve as a proxy indicator for another factor (e.g., sociability, alcohol expectancies) or some other undetermined marker that leads to safer sexual behavior among women in the intervention group. Finally, the findings may be a statistical artifact and need to be further replicated with diverse samples.

There are limitations to this study. Assessment of alcohol use was very general and only overall frequency of alcohol consumption was examined. Quantity and type of alcohol as well as event-specific associations relating to STI infection were not examined (e.g., alcohol use before sexual intercourse). Due to the relatively low reports of alcohol use among this sample of women, alcohol use was dichotomized into recent drinkers vs. abstainers during the past 30 days. It would have been ideal to examine the impact of different levels of alcohol use, including heavy alcohol use. The data on alcohol use also rely on retrospective self-report data. It is possible that participants had difficulty recalling important information, and/or they provided socially desirable responses to the sensitive questions (e.g., underreported alcohol consumption). However, it is noteworthy that the STI results were biological outcomes and not based on self-report. Finally, the sample was homogeneous; therefore, the results have limited generalizability and replication with diverse ethnic and geographic populations is needed.

Conclusions

The findings from this study revealed the HIV/STI intervention was effective at reducing STI acquisition among women who consumed alcohol but it was not effective in reducing STI acquisition among women who abstained from alcohol. Given the contrary nature of these findings and that the literature has supported a strong link between alcohol use and STI acquisition, it is important to consider other factors that may impact the efficacy of an HIV intervention among those who report alcohol consumption. A wide range of factors may contribute to STI risk among this group, as varying individual, partner-related, and contextual factors also play a role. From a clinical standpoint, the findings suggest that risk factors for STIs may vary across different populations. Further research is needed to better understand the impact of alcohol use on HIV intervention efficacy, particularly among individuals who report varying levels of alcohol use, including low, moderate, or heavy drinking. Future studies also could help determine the extent to which an alcohol component should be included as part of an HIV prevention intervention for those who report heavier alcohol consumption.

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Fig. 1.

The interaction between alcohol use and HIV/STI condition in predicting a positive test result for an STI over a 12 month follow-up period. The groups under alcohol were significantly different from each other ($p = 0.05$) and there were significant differences between “no alcohol” and “alcohol” among women who received the intervention ($p = 0.05$). Finally, there were significant differences between women in the intervention condition who consumed alcohol and women in the control condition who did not consume alcohol ($p = 0.05$)