

ALCOHOL – A PREDICTOR OF RISKY SEXUAL BEHAVIOR AMONG FEMALE ADOLESCENTS

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SUMMARY – Alcohol use has been linked to risky sexual practices among adolescents. However, limited research on alcohol use and risky sexual behavior has been conducted among female adolescents. This study examined a high quantity of alcohol as a longitudinal predictor of risky sexual behavior and sexually transmitted diseases (STDs) among female adolescents. Three hundred ninety-three adolescent females aged 15-21 were assessed for alcohol use and risky sexual behaviors. Participants also provided 2 swab specimens that were assayed for STDs. Use of high alcohol quantity was defined as ≥ 3 drinks in 1 sitting. Binary generalized estimating equation models were conducted assessing the impact of alcohol use at baseline on risky sexual behavior and STDs over a 12-month period. Age, intervention group and baseline outcome measures were entered as covariates. The results indicated that use of high alcohol quantity predicted inconsistent condom use, high sexual sensation seeking, multiple sexual partners, sex while high on alcohol or drugs, and having anal sex during 12-month follow-up period. These findings suggest that STD-related behavioral interventions for adolescents should discuss the link between alcohol and STD-risk behavior. Deeper understanding of alcohol as a predictor of risky sexual behavior among female adolescents is of paramount importance for development of efficient prevention programs at individual and community levels. The risk of acquiring an STD is higher among teenagers than among adults.

Key words: Adolescents; Health education; Risk factors

Introduction

The association between adolescent substance abuse and risk of sexually transmitted diseases (STDs) has been well documented with numerous studies indicating that adolescent substance abusers are at a high risk of acquiring or transmitting STD; approximately 25% of new STD cases are diagnosed in teenagers¹⁻³. This concurrence of substance use and risky sexual behavior has been consistently identified across diverse samples of adolescents, ranging from normative school-aged populations to adolescents typically identified as high-risk, such as those with mental illness,

inner-city and sexual minorities, and teens in drug treatment programs or in the juvenile system. Studies have documented that drinking alcohol is related to earlier sexual debut⁴, increased likelihood of having sex by as much as 50%⁵, and decreased likelihood to use condoms during sex⁶.

Substance-abusing adolescents are likely to report more sexual risk-taking than other high-risk adolescent subsamples, placing them at a heightened risk of acquiring or transmitting STDs. For instance, adolescent substance abusers use condoms less frequently during sex, have more sexual partners, show lower self-efficacy regarding safer sexual behavior, have more permissive attitudes toward sex, lower perceived peer norms supporting safer sexual behavior, are more likely to engage in prostitution for money, drugs, food, or shelter, and are more likely to have contracted an STD^{2,4,7-10}. These risky sexual practices are likely

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Received April 26, 2012, accepted August 24, 2012

to persist into adulthood if the adolescent continues to abuse alcohol or illicit drugs⁴.

In an urban STD clinic, males and females aged 15 to 24 with an alcohol or substance use disorder were significantly more likely to have multiple sexual partners, to be inconsistent condom users, and to have an STD¹¹. A study with a younger sample of sexually active adolescents (mean age 17.5) found that herpes simplex virus 2 infections were significantly higher among those with an alcohol use disorder (19%) than those without an alcohol use disorder (10.5%)¹².

Little research has examined alcohol consumption and high-risk sexual behavior in adolescents over time, and to our knowledge, no studies have linked alcohol consumption with biologic markers of newly acquired STDs. The few studies exploring the association between alcohol use and risky sexual behavior and STDs illustrate a significant relation between these variables among females. However, the majority of this research was conducted among adult, alcohol abusing populations. Whether alcohol use is associated over time with sexual risk-taking and STDs among adolescent females is not well-established in the literature. The current study addressed this gap in the literature and examined alcohol use at baseline as a predictor of risky sexual behaviors and STDs over a 12-month follow-up period among female adolescents.

Subjects and Methods

Participants

Participants were part of a study conducted from February 2009 to June 2011. Adolescent females aged 15–21 were recruited from 51 secondary schools in Croatia. Of the eligible adolescents, 84.4% (N=715) were enrolled in the study, completed baseline assessments, and were randomized to study conditions. Regarding retention, 610 (85.3%) subjects completed 6-month assessment and 605 (84.6%) completed 12-month assessment. Study parameters were alcohol use, risky sexual behavior, and psychosocial correlates of risky sexual behavior, including sexual sensation seeking.

Measures

Sociodemographics. Participants completed questions regarding their age, education level, and whether they were currently attending school.

Alcohol use. The primary exposure, quantity of alcohol use was assessed by asking adolescents at baseline: “How many alcoholic drinks do you usually have at the time?”

Risky sexual behavior. Participants completed questions regarding the range of risky sexual behavior: sex while high on alcohol or drugs over the past 60 days (yes/no), multiple sexual partners during the past 60 days (yes/no), consistent *versus* inconsistent condom use, and engaging in anal sex (yes/no). Consistent condom use over the past 30 days was defined as the use of a condom during every episode of vaginal intercourse.

Sexual sensation seeking. Sexual sensation seeking was assessed by a 9-item scale¹³.

Examples of the items include: “When it comes to sex, I am willing to try anything” and “Stopping to use a condom during sex takes the fun out of sex”. Participants rated each item from 1 (strongly disagree) to 4 (strongly agree), with higher scores indicating higher levels of sensation seeking. Cronbach α was 0.75 at 6-month follow-up and 0.79 at 12-month follow-up.

Sexually transmitted diseases. Participants provided 2 self-collected vaginal swab specimens¹⁴. Specimens were delivered to the laboratory. One specimen was assayed for *Chlamydia (C.) trachomatis* and *Neisseria (N.) gonorrhoeae*. Initially, *C. trachomatis* and *N. gonorrhoeae* were assayed using the Abbott LCx Probe System (Abbott Laboratories, Abbot Park, IL)^{15–17}. In September 2009, this assay was discontinued and all subsequent testing used the BDProbeTecET *C. trachomatis* and *N. gonorrhoeae* Amplified DNA assay (Becton Dickinson and Company, Sparks, MD)¹⁸. The second specimen was tested for *Trichomonas (T.) vaginalis* using a noncommercial real-time polymerase chain reaction assay¹⁹. Participants with a positive STD test received directly observable single-dose antimicrobial treatment, risk-reduction counseling according to the Centers for Disease Control and Prevention recommendations, and were encouraged to refer sex partners for treatment.

Data analysis

Descriptive statistics determined the prevalence of sociodemographic characteristics, quantity of alcohol use, high-risk sexual behavior, and STDs. Sexual sensation seeking was dichotomized utilizing the median split technique. Participants who reported al-

Table 1. Prevalence of alcohol use, risky sexual behaviors, and sexually transmitted diseases (STD)

	n (%)	n (%)	
Alcohol quantity		12-month follow-up	
3 or more drinks in one sitting	105 (26.7%)	Consistent condom use	
Less than 3 drinks in one sitting	288 (73.3%)	Yes	82 (30.5%)
6-month follow-up		No	187 (69.5%)
Consistent condom use		Sexual sensation seeking	
Yes	78 (30%)	High	165 (50.9%)
No	182 (70%)	Low	159 (49.1%)
Sexual sensation seeking		Sex while high on alcohol or drugs	
High	161 (50.6%)	Yes	116 (35.8%)
Low	157 (49.4%)	No	208 (64.2%)
Sex while high on alcohol or drugs		Anal sex	
Yes	121 (38.1%)	Yes	101 (31.2%)
No	197 (61.9%)	No	223 (68.8%)
Multiple sexual partners during the past 60 days		Multiple sexual partners during the past 60 days	
Yes	106 (33.3%)	Yes	92 (28.4%)
No	212 (66.7%)	No	232 (71.6%)
Anal sex		Any sexually transmitted disease	
Yes	89 (28%)	Yes	59 (18.4%)
No	229 (72%)	No	262 (81.6%)
Any sexually transmitted disease		Gonorrhea	
Yes	92 (28.6%)	Yes	8 (2.5%)
No	230 (71.4%)	No	313 (97.5%)
Gonorrhea		Chlamydia	
Yes	19 (5.9%)	Yes	26 (8.1%)
No	303 (94.1%)	No	295 (91.9%)
Chlamydia		<i>Trichomonas vaginalis</i>	
Yes	52 (16.1%)	Yes	35 (10.9%)
No	270 (83.9%)	No	287 (89.1%)
<i>Trichomonas vaginalis</i>			
Yes	37 (11.4%)		
No	287 (88.6%)		

cohol consumption over the past 60 days at baseline (393/715; 55%) were included in the analysis. Use of high alcohol quantity was defined as 3 or more drinks in 1 sitting. Bivariate and multivariate analyses were conducted using binary generalized estimating equations (GEE) models. GEE models specifically were designed to control for repeated within-subject measurements and allow for a number of observations on study participants longitudinally.

Results

Participant characteristics on the variables of interest are displayed in Table 1. The mean age at baseline was 17.9 (SD=1.7) years. The majority of participants

were full-time students (65.3%), and 31.1% reported graduating from high school. Most participants reported they were currently in a relationship (83.6%). After controlling for age, intervention group, and outcome measures at baseline, GEE models revealed that female adolescents reporting high quantity of alcohol use at baseline, relative to those reporting low quantity, were more likely to test positive for *T. vaginalis*, report inconsistent condom use, report high sexual sensation seeking, have sex while high on alcohol or drugs, have multiple sexual partners, and engage in anal sex over the 12-month follow-up period (Table 2). There were no significant findings for alcohol use predicting gonorrhea or chlamydia infection over the 12-month follow-up period.

Table 2. Quantity of alcohol use as a predictor of risky sexual behaviors and sexually transmitted diseases (STDs) over a 12-month period

	High alcohol quantity n (%)	Low alcohol quantity n (%)	PR	AOR	95%CI	P
Positive for						
<i>Trichomonas vaginalis</i>	28 (16.9%)	44 (9.2%)	1.99	2.00	1.11-3.60	0.02
Positive for gonorrhoea	10 (6%)	17 (3.5%)	1.74	1.83	0.86-3.89	0.12
Positive for chlamydia	19 (11.4%)	59 (12.4%)	1.09	1.10	0.62-1.93	0.75
Inconsistent condom use	106 (80.3%)	263 (66.2%)	2.40	2.46	0.30-4.65	0.006
High sexual sensation seeking	110 (67.1%)	216 (45.2%)	2.48	2.01	1.25-3.23	0.004
Sex while high on alcohol or drugs	84 (51.2%)	153 (32%)	2.24	1.53	0.99-2.37	0.05
Multiple sexual partners during the past 60 days	63 (38.4%)	135 (28.2%)	1.59	1.56	1.02-2.39	0.04
Engage in anal sex	71 (43.3%)	119 (24.9%)	2.26	1.81	1.05-3.11	0.03

PR = prevalence ratio; AOR = adjusted odds ratio using low frequency of alcohol use as reference category; models are controlling for age, intervention group, and outcome measures at baseline; 95%CI = 95% confidence interval.

Discussion

Previous studies have established the relationship between adolescent substance abuse or concurrence of substance use and risky sexual behavior, placing them at a higher risk of acquiring STD^{2,3,20}. The results indicated that high quantity of alcohol use predicted a positive STD test for *T. vaginalis*, inconsistent condom use, high sexual sensation seeking, having sex while high on alcohol or drugs, multiple sexual partners, and engaging in anal sex. Previous research has indicated that alcohol is associated with risky sexual behavior, including decreased condom use^{6,10}, increased likelihood of having sex⁵, and multiple sexual partners¹⁰. However, to our knowledge, many of the findings in the current study, such as high quantity of alcohol use predicting positive test result for *T. vaginalis*, sexual sensation seeking, sex while high on alcohol or drugs, and engaging in anal sex have not been previously examined longitudinally, particularly among female adolescents.

Interesting, high quantity of alcohol significantly predicted a positive test result for *T. vaginalis*, but was not significant for chlamydia and gonorrhoea. The prevalence rates for chlamydia and gonorrhoea also were substantially lower at 12-month follow-up than 6-month follow-up, but this was not observed with *T. vaginalis*. Although women were treated for STDs at each assessment, previous research has indicated that the reinfection rate for *T. vaginalis* may be high, es-

pecially given that it is not a reportable infection and partner treatment may be low²¹. Additionally, it is possible that the adolescents were asymptomatic²², and the infection was not detected or treated at 6-month follow-up, but was detected at 12-month follow-up.

Although the study was longitudinal in nature, these findings do not necessarily imply a direct link between alcohol use, risky sexual behavior, and STDs. Other factors, such as negative condom attitudes, lack of risk-avoidance strategies, partner/interpersonal factors, personality domains, and alcohol expectancies, to name a few, have been associated with high-risk sexual behavior²³⁻²⁹, and may play a moderating/mediating role in the relationship between quantity of alcohol use and risky sexual behavior, STDs, and sexual sensation seeking. Additional research is needed to further elucidate the mechanism and nature of the relationship between alcohol use and risky sexual behavior.

Despite several significant and interesting findings, it is necessary to discuss the potential methodological limitations. The data on alcohol and sexual behavior rely on retrospective self-report data. It is possible that participants had difficulty recalling important information, and/or they provided a socially desirable response to sensitive questions. Also, assessment of alcohol use was very general, as only overall quantity of alcohol consumption was examined in this study.

Conclusion

These findings suggest that STD-related behavioral intervention for adolescents should incorporate information regarding the link between alcohol and STD-risk behavior. Deeper understanding of this relationship is of paramount importance for development of efficient prevention programs at individual level. For example, information on how alcohol impairs sexual decision-making and sexual communication (e.g., adolescents may be less likely to ask their partner to wear a condom) could be beneficial. Peer pressure and norms regarding alcohol consumption also should be explored, especially in situations where adolescents are trying to “fit in” with their peers. Finally, it may be helpful to explore the role of television and music, where alcohol and sexual behavior may be depicted in a positive light, and to explore the potential negative consequences of engaging in these behaviors in reality. Previous research has indicated that adolescents who perceive the benefits of alcohol use as positive are less likely to perceive negative risks associated with their behavior. When adolescents report having positive experiences with alcohol use, this contradicts the typical negative messages they may hear regarding alcohol use. As a result, they may discount any potential negative consequences of their behavior³⁰. Therefore, when discussing alcohol and risky behavior, it is pertinent to include both the positive and negative consequences of this behavior, so that the message is viewed as more credible.

In terms of clinical implications, physicians and clinicians who provide STD services should be encouraged to screen adolescents for alcohol consumption, especially those engaging in high-risk sexual behavior. Alcohol use could serve as a marker for risky sexual behaviors among female adolescents. It is important to identify these adolescents when they first initiate a risk-taking behavior. Screening for *T. vaginalis* is pertinent, as infections may be asymptomatic and persist for a long time²¹. Therefore, screening programs for *T. vaginalis* are necessary, especially given that the infection is easily treatable^{21,31}.

Education and school settings could be one venue of providing STD services^{32,33} and education regarding potential risk factors leading to risky sexual behavior (e.g., alcohol consumption). Additionally,

internet-based prevention programs have been found to be effective, particularly among adolescents³⁴. One program utilized text messaging to provide information regarding STD services³⁵. Overall prevention programs, hospitals, and clinics should endeavor to provide integrated services for reducing alcohol consumption and risky sexual behavior and STDs among high-risk female adolescents. By coordinating services, early detection of potential alcohol and physical and sexual health problems will be facilitated^{36,37}.

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Sažetak

ALKOHOL – PREDIKTOR RIZIČNOG SEKSUALNOG PONAŠANJA MEĐU ADOLESCENTICAMA

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Konsumacija alkohola se povezuje s rizičnim seksualnim ponašanjem među adolescenticama. Provedeno je ograničeno istraživanje o konzumaciji alkohola i rizičnom seksualnom ponašanju među ženskim adolescentima. Studija je ispitala povećanu količinu alkohola kao longitudinalni prediktor za rizično seksualno ponašanje i spolno prenosive bolesti među adolescenticama. Tri stotine devedeset i tri adolescentice u dobi od 15 do 21 godine ispitane su o upotrebi alkohola i rizičnom seksualnom ponašanju. Adolescenticama je također uzet uzorak brisa koji je testiran na spolno prenosive bolesti. Utvrđena je visoka količina alkohola od ≥ 3 pića u jednom „sjedu“. Istraživanje je provedeno ocjenjujući utjecaj konzumacije alkohola na rizično seksualno ponašanje i spolno prenosive bolesti u razdoblju od 12 mjeseci. Rezultati su pokazali da velika količina alkohola predodređuje nedosljednu uporabu kondoma, često traženje seksualnih senzacija, višestruke seksualne partnere, seks pod utjecajem alkohola ili droga te analni seks u razdoblju nakon 12 mjeseci. Ta otkrića ukazuju na to da bi intervencije vezane uz prevenciju spolno prenosivih bolesti trebale raspravljati o vezi između alkohola i rizičnog ponašanja vezanog uza spolno prenosive bolesti. Bolje razumijevanje utjecaja alkohola kao prediktora rizičnog seksualnog ponašanja među adolescenticama povezano je s izradom učinkovitih preventivnih programa na individualnoj i društvenoj razini. Rizik od obolijevanja od spolno prenosivih bolesti je veći među adolescentima nego među odraslima.

Ključne riječi: *Adolescenti; Zdravstvena izobrazba; Čimbenici rizika*

