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Original article

Relationships Between Current and Past Binge Drinking and Systolic Blood Pressure in Young Adults

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A B S T R A C T

Purpose: Heavy episodic (i.e., "binge") drinking (i.e., ≥five drinks/occasion) is highly prevalent among young adults; those who binge do so four times per month on average, consuming nine drinks on average on each occasion. Although it is well established that chronic heavy drinking (≥two alcoholic beverages per day) increases the risk of hypertension, the relationship between binge drinking and blood pressure is not well described. Our aim was to describe the relationship between frequency of binge drinking, both current (at age 24 years) and past (at age 20 years), and systolic blood pressure (SBP) at age 24 years.
Methods: Participants (n = 756) from the longitudinal Nicotine Dependence in Teens study reported alcohol consumption at ages 20 and 24 years and had SBP measured at age 24 years. We examined the association between binge drinking and SBP using multiple linear regression, controlling for sex, race/ethnicity, education, monthly drinking in high school, cigarette smoking, and body mass index.
Results: Compared to nonbinge drinkers, SBP at age 24 years was 2.61 [.41, 4.82] mm Hg higher among current monthly bingers and 4.03 [1.35, 6.70] mm Hg higher among current weekly bingers. SBP at age 24 years was 2.90 [.54, 5.25] mm Hg higher among monthly bingers at age 20 years and 3.64 [.93, 6.35] mm Hg higher among weekly bingers at age 20 years, compared to nonbinge drinkers.
Conclusions: Frequent binge drinking at ages 20 and 24 years is associated with higher SBP at age 24 years and may be implicated in the development of hypertension.

IMPLICATIONS AND CONTRIBUTION

Little is known about the relationship between binge drinking and blood pressure (BP) in young adults. This study showed that frequency of binge drinking, past and present, is associated with higher systolic BP, which may pose a risk for developing hypertension. Practitioners should inquire about binge drinking when monitoring BP.

Numerous reports [1–3] suggest that alcohol consumption is associated with higher blood pressure (BP) and furthermore, that moderate to heavy drinking raises the risk of essential hypertension [4–6]. In cross-sectional analyses of CARDIA data for >5,000 US adults age 18–30 years, mean systolic BP (SBP) was directly associated with daily alcohol intake in white and black males and in white females [7]. Similarly, cross-sectional data for >14,000 adults (median age 29 years) participating in the 2008 wave of the National Longitudinal Study of Adolescent Health showed that consuming two drinks (females) or three drinks (males) on 5–7 days per week was associated with a 5.3 mm Hg increase in SBP. Heavier drinking (i.e., >two drinks (females) or >three drinks (males) on 5–7 days per week) was associated with a 4.5 mm Hg

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increase in SBP after controlling for body mass index (BMI) and smoking [8].

Variability in daily alcohol intake has rarely been investigated as a risk factor for high BP. INTERSALT, an international multicenter epidemiological study of 9,681 men and women, age 20–59 years, investigated the separate influence on BP of overall alcohol consumption and daily variability in consumption [9]. Overall, daily alcohol consumption was related to SBP. Compared to nondrinkers, SBP was 4.6 mm Hg higher among men who consumed 6–7 drinks per day and 3.9 mm Hg higher among women who consumed 3–4 drinks per day. SBP also tended to be higher than in nondrinkers among men and women who drank fewer than three drinks per day, but the differences were not statistically significant. Variability in daily drinking was independently associated with higher SBP. Compared to nondrinkers, SBP was 4.5 mm Hg higher among men whose daily alcohol consumption was episodic and highly variable and who drank 3–4 drinks per day, on average and 2.2 mm Hg higher among men who drank fewer than three drinks per day, on average, after controlling for age, BMI, and smoking [9].

Binge drinking (i.e., consuming ≥five alcoholic beverages on a single occasion [10]) is associated with highly variable patterns of daily consumption and may be linked, over and above chronic heavy drinking, to higher BP. In a cross-sectional study of 14,000 adults age 45–69 years in Eastern Europe, compared to those who did not binge and those who binged (i.e., ≥seven drinks for men and ≥four drinks for women in one session) less than once/month, men who binged at least once a month had a 62% greater likelihood and women a 31% greater likelihood of having hypertension (systolic > 140 mm Hg and/or diastolic > 90 mm Hg) [11]. This effect was independent of annual alcohol intake.

Many young adults binge drink. Past-year prevalence estimates for 18–19 year olds were 31% in the United States [10] and 43% in Canada [12], whereas estimates for 20–24 year olds were 45% in the United States [10] and 32% in Canada [12]. Of particular concern is that 18- to 24-year-old binge drinkers report 4.2 binge drinking episodes per month on average, and they consume 9.3 drinks (approximately 126g of pure ethanol [13]) on average per binge drinking occasion [14].

Although many studies explore the association between alcohol and chronic disease, the biological pathways leading from alcohol consumption to the early origins of chronic disease are not well understood. Given the dearth of studies investigating binge drinking as a risk factor for elevated BP and hypertension in young adults, our aim was to determine if current or past binge drinking is associated with SBP in a sample of young adults. We examined this objective in both cross-sectional and longitudinal analyses to broaden our understanding of the possible relationship between binge drinking and the development of hypertension.

Methods

Data were drawn from the prospective longitudinal Nicotine Dependence in Teens (NDIT) study conducted in Montréal, Canada [15]. A cohort of 1,294 students in grade 7, recruited in 1999 from 10 secondary schools, completed a self-report questionnaire at school every three months for a total of 20 surveys over the five years of secondary school (1999–2005). Schools were selected to include students from urban, suburban, and rural areas; from high, moderate and low socioeconomic status families; and who spoke either French and/or English. In two additional postsecondary school surveys, questionnaires were mailed to participants' homes in 2007–2008, when they were age 20 years on average; in 2011–2012 (age 24 years on average) questionnaires were completed and anthropometric and BP measurements were taken in the NDIT offices. Parents provided consent and participants provided assent during the secondary school cycles; participants provided consent in the postsecondary school surveys. The NDIT project was approved by the ethics research committee of the Centre de Recherche du Centre Hospitalier de l'Université de Montréal.

Characteristics of NDIT participants at baseline resembled those of a provincially representative sample of youth aged 13 years from the Quebec Child and Adolescent Health and Social Survey [15]. Between baseline (grade 7) and the final survey cycle in high school, 85 of the 1,294 baseline NDIT participants were lost to follow-up. An additional 130 participants refused follow-up after the first postsecondary school cycle (at age 20 years) [15, Table 2]. The second postsecondary cycle (at age 24 years) was completed by 858 participants (79.5% of the 1,079 who remained eligible to participate at age 24 years); 781 of 858 provided BP measures [15; Table 2].

For the current analysis, we identified individuals whose SBP was measured at age 24 years and who provided data on the frequency with which they drank alcoholic beverages in the year preceding the measurement of BP (the "cross-sectional" analysis, so labeled because data on alcohol consumption and BP were collected at the same point in time). Most of those participants had also provided data on their alcohol consumption in the year preceding the survey at age 20 years (the "longitudinal" analysis, so labeled because frequency of alcohol consumption was measured four years before the BP measurements were taken).

Study variables

We chose SBP as the outcome measure because it is a stronger predictor of cardiovascular risk and leads to more accurate diagnosis and staging of hypertension than diastolic BP [16,17]. It has been suggested as the primary target of antihypertensive treatment [18]. SBP was assessed at age 24 years by trained technicians using standardized methods [19]. After the participant had voided and rested for 5 minutes, BP was assessed in the sitting position, on the right arm with the arm resting at heart height on a table, with an oscillometric device (Dinamap XL, model CR9340, Critikon Co, Tampa, FL). Cuff size (Brassard Baumanomètre) was determined by arm circumference: 16.0–22.5 cm, size 9 (adolescent), 22.6–30.0 cm, size 12 (adult), 30.1–37.5 cm, size 15 (large adult), 37.6–43.7 cm, size 17.5 (thigh). Oscillometric devices were calibrated against a mercury sphygmomanometer before each data collection period. Three consecutive measures were obtained at 1-minute intervals. If the difference between the second and third readings exceeded 20 mm Hg, then fourth and fifth readings were taken. To reduce BP reactivity or habituation, the first reading was not considered [20]. We calculated the mean of the two closest remaining readings.

We assessed alcohol consumption at age 20 years (labeled herein as "past drinking") and at age 24 years (labeled herein as "current drinking") with two questions: "During the past 12 months, how often did you drink alcoholic beverages?" and "During the past 12 months, how often did you drink 5 or more alcoholic beverages on one occasion?" Response options were never, <once a month, 1–3 times per month, 1–6 times per