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The Need of Widening the Lens of Alcohol Research, but Sharpening the Focus on Type of Alcoholic Beverage

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The American Distilling Institute was founded in 2003 to promote craft distilleries, and they are doing an excellent job as the craft distilling industry is growing at a rapid pace [1]. U.S. based distilleries grew from 24 in 2000 to 400 in 2013, and the institute proudly estimates that there will be approximately 700 craft distilleries in 2015 [1]. The craft distilleries are producing whisky, moonshine, gin, bourbon, vodka, among many other alcoholic beverages. The movement is expanding, and although in the past legal distilleries could sell only to retailers, now in some states they have become tourist attractions, and can directly sell spirits by the glass and by the bottle. Although breweries could be seen as a path for economic development, tourism, and job creation, we should realize that every gold mine carries problems.

In the United States excessive alcohol consumption accounts annually for an average of 79,000 deaths and 2.3 million years of potential life lost, making it the third-leading preventable cause of death in the country, surpassed only by smoking and obesity [2]. Hazardous alcohol use can damage every organ system. Thus it is not surprising that the economic toll of hazardous alcohol use on the American economy was $223.5 billion [2]. Accordingly, extensive efforts to reduce hazardous alcohol use have been embraced. As a result of the overlap among alcohol industry activities, public health, and academic medicine, the Federal government statistics have shown that underage alcohol consumption has significantly declined [1,3]. Yet, epidemiologic data also suggests that beverage consumption among high school students has shifted from beer to liquor [3]. However, the good news does not applied to other age groups. Among college students, the Healthy Campus 2010 objectives of reducing the proportion of college students engaging in binge drinking from 39% to 20% has not been met [4,5]. Indeed, now rates of binge drinking among college students have been estimated at 39.5% [4-6]. Although college students imbibe everything, beer and wine have been more popular among moderate users than among heavy users in both sexes. A higher preference for liquor or beer has been observed among hazardous users and those with other riskier patterns of alcohol consumption (i.e. binge drinking or blackouts) [7,8]. Hard liquor use is also more frequently reported among those who engaged in other risky behaviors such as drinking and driving, and not meeting school responsibilities [7,8]. In addition, many cross-sectional studies have examined the relationship between hard liquor use and violence, almost all of which have found significant positive relationships [7,8].

So the obvious question becomes, why they are drinking so much? And why is this shift occurring? The pressure of society and marketing partially explains why. In the context of school and college social acceptability, peer pressure plays an important role in drinking behaviors [9]. Non-drinkers would be seen as an out-group because they are not participating in the normative behavior of alcohol use, which is considered a "positive and socially acceptable experience" [9]. In addition, if you do not want to be perceived as a "light weight" you cannot drink "Mamas' juice" or in other words, wine. According to a recent article, by Siegel and colleagues, Jack Daniel's whisky, Hennessy cognac, Grey Goose vodka and Patron tequila accounted for more than half of the brand-specific mentions in songs that reference alcohol on Billboard Magazine's year-end charts from 2009-2011 [8]. The study also found that these references to alcohol often glamorized partying and underage drinking. In addition to the music, Agent 007 has notoriously evolved during the years, but isn't giving up his martinis. For the glamorous female protagonist in Sex and the City, a colored cosmopolitan is the drink of choice.

The pressure to be skinny not only increases smoking among young women, but type of alcohol preference. According to a public discussion in Lehigh University's Women's Center, female body image plays a large role in the increased popularity of hard liquor among women because "it has fewer calories" [10]. This urgency for a perfect body image is opening another can of worms: "smoking alcohol" achieved by using nebulizers, carbon dioxide pills, and dry ice turns liquid alcohol into an alcohol-rich cloud with almost no calories. It also affords the users quick intoxication [11]. However, this new system's risks are especially salient when it comes to the respiratory and the central nervous systems. The harmful effect on the respiratory track derives from the direct exposure to harmful chemicals. Similar to other solvents, the damage in the central nervous system probably derives from the rapid delivery of high concentrations of ethanol to the brain resulting in multifocal myelin loss [12,13]. In simple words, they are not only shrinking their waist lines, but also their brains, as high and chronic doses of alcohol are linked to brain volume reductions [12]. Particularly for women, as studies suggests that females are more vulnerable than males with regards to the brain damaging effects of excessive alcohol use [14]. In addition, damage tends to appear sooner in women than for men [15].

Another dangerous global trend is that the richer the country, the smaller the gap between adult women and men alcohol drinking rates. A national analysis of hospitalizations for alcohol overdose found that the rate of young females aged eighteen to twenty-four, jumped 50 percent between 1999 and 2008 [16]. In the same period, the rate for young men rose only 8 percent [16]. In addition, many raised their concerns that "alcohol has become a social crutch-leaned upon because there is nothing to do at a party but drinking". So what? Given brain development, these rates of alcohol use among the new generation are a special concern. In addition, for a sizable number of young women, being drunk often results in being physically and sexually abused [17,18].

These days nearly two-thirds of all American women drink

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regularly, at a rate higher than any other than in the past decades [19]. Those in high-status occupations, working in male-dominated environments, have an increased risk of alcohol-use disorders [19]. Therefore it is not surprising the rise in alcohol marketing targeting women. So, similarly to what is happening with tobacco, companies selling alcohol are trying to appeal to the female consumers.

Yet, why is there a scandal over women taking a daily drink of alcohol as a respite after a stressful day? What is the problem with a couple of drinks with friends, which can act as a social tonic? Why it is not so outrageous when a man has a drink after work? From the social perspective, there is none!!! It is well-deserved, however, from a scientific perspective the response is different: female metabolism, body structure and chemistry results in higher rates of absorption, and longer time to remove it, as a result women need only 7 drinks per week to cross the line of health-risks. Men can consume up to 14 drinks per week before endangering themselves, so a daily drink for a man is way under the calculated limit of doses of alcohol for males [20]. In addition, women are more vulnerable to the long-term effects of alcohol (i.e. Hazardous alcohol use increases the risk for breast cancer) [20]. That makes a big difference, and it is this "unfairness" of Mother Nature that is the reason behind the scientific upset, and not "machismo" or discrimination against women.

But, is liquor more dangerous than wine or beer? According to the CDC the answer is "NO"; a 12-ounce can of beer and a five-ounce glass of wine contain the same amount of alcohol as 1.5 ounces of liquor [21]. Yet, this answer does not appear to be totally truthful. When it comes to the manufacturing process not all alcohol is created equal. For example, a standard shut of liquor can have an alcohol concentration (or proof) anywhere from 15%-75% (Bacardi 151). So, as far as the risks of inebriation, one standard cup of wine or a beer is closely related, but the concentration of alcohol in 1.5 ounces of hard liquor is not always the same. In addition to concentration, time is another moderating variable. If you drink beer, it will take longer to achieve high alcohol concentrations due to the large volume of water and the carbonation will fill you fast. Studies suggest that wine and beer are more frequently consumed during meals than liquor [22]. Consumption of alcohol with food produces an "alcohol washing effect" that modifies the absorption and the effect of ethanol [22].

Beyond the maths and the ratios (to calculate ethanol concentration, absorption…..) the alcohol's two faced nature (friend or foe), does not only come from the concentration of its main active ingredient, a simple molecule called ethanol. The difference also arises from its other components. For example, wine is known for its high content of antioxidants and flavonoids. It also contains high concentrations of resveratrol [23]. Beer also contains antioxidants and silicones that are good for your health, yet most hard liquors are pure alcohol. Can this make a health difference? Although data is limited and not always consistent, let me briefly summarize some findings that suggest a positive answer.

Effects on Overall Health

By focusing on health differences by type of alcoholic beverage, we can see more clearly that may be beer, wine and liquor are not the same. A review of over 100 prospective studies have shown an inverse association between moderate drinking and risk of heart attack, stroke, and peripheral vascular disease [24]. However, the beneficial effect is fairly consistent, but largely corresponds to the presence of antioxidants. In the same line, a prospective observational study of ≈37 000 adults found wine consumption, but not beer or spirit consumption, to be associated with a significantly lower risk of type 2 diabetes [25].

Analyses from large studies such as those coming from the INHANCE Consortium uncover excessive risks for oral and pharyngeal cancer among beer and liquor users but not for wine drinkers [26]. Differences were attributed at least in part to 'anticarcinogenic compounds in wine such as resveratrol, and phenolics that have been shown to inhibit tumor initiation and progression in experimental studies' [26]. Similarly an excessive risk of lung cancer is tied to consumption of beer and liquor [27]. This has been observed and explained, at least in part, by the significant relationship between intake of beer and spirits with smoking. Notably, wine consumption seems to exert a protective effect [27].

Although hazardous alcohol consumption is known to exert a deleterious effect on cognition and brain integrity, there is also increasing literature suggesting a protective effect of moderate alcohol consumption on dementia [20,28,29]. Notably, population based studies such as the 34-Year follow-up population study of Women in Goteborg, suggests that this neuro-protective effect differs by choice in alcoholic beverage [28]. In the analyses, they uncovered a beneficial effect of wine only that was attributed to "the complex mixture that comprises wine or the healthier lifestyle ascribed to wine drinkers" [28]. On the other hand consumption of liquor was deleterious. A similar trend was described by Wilhelm and colleagues, who found that hazardous alcohol consumption of liquor, increased the risk of homocystein alterations and the extent of brain atrophy as compared to those preferring beer [12]. Beer contains significant amounts of B-vitamins and folate, which might explain the lowest homocysteine plasma levels observed in the beer-preferring subgroup, and that seems to act as a protective factor against brain structural damage [12]. In another large, population-based study, a negative association between light to moderate alcohol consumption and ischemic stroke was found [29]. Regarding type of alcoholic beverage, light to moderate consumption of wine was the only one that appeared to have a favorable effect on stroke risk [29]. Overall, epidemiological data also suggests a more advantageous quality of life experience and lower mortality rates for drinkers of wine than for drinkers of liquor or beer [30-32].

The Bottom Line

Given the complexity of alcohol's effects on the body, the lack of a comprehensive database of alcohol content by brand, and the variety of the people who drink it, drawing a definitive conclusion is difficult. Yet, current publications lead one to wonder if liquor is more dangerous than wine or beer. As a scientist, a call for additional research based on standardized measures and instruments is necessitated. It is also humbling to recognize that based on the scientific research tools (i.e. Medline, PubMed, Highwire, NIH and CDC sites), one hardly recognizes the extent, myths and trends of these problems. The magic of internet has allowed me to expand my alcohol knowledge in these areas. Public health authorities, politicians, judges, parents and even youths need to "do their homework" so at different levels, they can take better informed decisions (profits versus harms). If this research is done, then a novel understanding will be gained regarding the benefit of liquor tax increases. This will hopefully reverse the state of current history as 92% (335 out of 364) of major alcohol tax proposals in the states have been defeated [33]. As a woman and a mother, this topic is something that should be talked about with colleagues, daughters, sons, and friends alike. The many dangers of excessive drinking, but very particularly, those of hard liquors should be shared, even if the data is not conclusive, as it is better to be safe than sorry.

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