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Understanding standard drinks and drinking guidelines

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Abstract

Introduction and Aims—For consumers to follow drinking guidelines and limit their risk of negative consequences they need to track their ethanol consumption. This paper reviews published research on the ability of consumers to utilise information about the alcohol content of beverages when expressed in different forms e.g. in standard drinks or units versus percentage alcohol content..

Design and Methods—A review of the literature on standard drink definitions and consumer understanding of these, actual drink pouring, use of standard drinks in guidelines and consumer understanding and use of these.

Results—Standard drink definitions vary across countries and typically contain less alcohol than actual drinks. Drinkers have difficulty defining and pouring standard drinks with over-pouring being the norm such that intake volume is typically underestimated. Drinkers have difficulty using percentage alcohol by volume and pour size information in calculating intake but can effectively utilise standard drink labeling to track intake.

Discussion and Conclusions—Standard drink labeling is an effective but little used strategy for enabling drinkers to track their alcohol intake and potentially conform to safe or low risk drinking guidelines.

Keywords

guidelines; standard drink; labeling; measurement

Introduction

Understanding and adhering to safe or low risk drinking guidelines, moderating alcohol intake to insure a blood alcohol content (BAC) that is legal for driving or limiting alcohol intake for other health, safety or personal reasons all involve accurate tracking of alcohol intake. Drinker's tracking of alcohol intake in turn requires some type of accurate information alcohol content of the specific beverages being consumed. This information could include variously the alcohol concentration by volume (%ABV) of the beverage, the number of a defined standard drinks or units in a container, the volume of a beverage at a particular %ABV that comprises a standard drink or unit, the number of grams (g), milliliters (ml), ounces (oz.) or other measures of alcohol in a container or drink. The aims of this article are to review the scientific literature on standard drinks or units as they relate to actual drinks, drinker understanding of standard drinks or units, alcoholic beverage labeling and drinking guidelines. The selected studies were found through the authors' previous research in these areas, searches of Medline and Google Scholar and examination

of the references of obtained articles. After summarizing the research for each topic we provide some general recommendations and key areas of focus for future research.

The “Standard Drink” or ”Unit”

The “standard drink” - or “unit of alcohol” as it is referred to in the UK - is an important concept for conveying information about alcohol intake for drinkers, measuring alcohol intake in research studies and estimating and communicating risks or benefits of drinking based on these measures. The concept has two main sources: a) as a means of communicating levels of consumption in low risk drinking guidelines and b) as a means of asking respondents to some drinking surveys to estimate the amount of alcohol they drink. The standard drink is appropriately a national concept because drink pours and beverage choices vary considerably across countries. Many countries have a national standard drink or unit with alcohol contents ranging from 8 to 23.5 grams of ethanol (1). These are usually conceived in relation to the most commonly drunk beverage type such as the common bottle size (355ml) of typical strength (5%ABV) of beer in the US (14g) and Canada (13.45g). Others, such as the UK, chose a smaller unit size (8g) so as to accommodate smaller pour sizes without resorting to fractional units. The standard drink or unit would then be communicated to the public in terms of equivalent and readily understood serving quantities of beer, wine, spirits or other beverage types at typical %ABV strength. The standard drink or unit size is also expressed more technically in terms of ounces, milliliters and/or other measures by beverage type depending on the country. “Grams of ethanol” is the most basic and comparable measure, particularly for scientific audiences, and is relevant to consumers in comparison to other ingredients on nutritional labels in relation to calories. However, grams or other weight-based measures are unlikely to be useful in helping drinkers to understand alcohol content. (18)

A major difficulty in determining or communicating information about standard drink or unit pour sizes is the variability of %ABV within beverage types. A 2.8%ABV beer has half the alcohol of 5.6% beer and 1/3 the alcohol of an 8.4% beer. This makes it difficult to provide a common pour size for beer. Similarly, wines vary widely such that a US standard drink (14g) would require a 6oz. (1 US ounce=29.6ml) pour at 10%ABV, a 5oz. pour at 12%ABV and a 4oz. pour at 15%ABV, all fairly common alcohol levels in wines. Because drinkers cannot easily discriminate between %ABV levels in drinks, labeling of %ABV and also standard drinks or units per container are needed to allow drinkers to track their intake. A 1989 British study directly examined the ability of drinkers to estimate the alcohol content of different strength drinks including beers ranging from 1% to 10.9%, ‘lagers’ from 0.9% to 8.6% and wines from 7% to 13% (2). Ability to discriminate between %ABV levels and estimate ethanol content numbers of units was found to be poor. A 1991 US study examined the drinking behaviour of college students in relation to drink strength at specially organised social gatherings at which the (free) beer was either 3% or 7%ABV (3). Drinkers tended to drink about the same volume at either of these very different strengths. The popularity of higher strength beers in the 6–9%ABV range and even up to 12%ABV in some countries has increased the difficulty of communicating standard drink and other alcohol intake-related information at the same time as increasing the importance of such information. The increasing popularity of high %ABV wine (4) as well as both lower and higher %ABV spirits products in many countries has complicated standard pour descriptions for these beverage types as well. Given this variation within beverage types, a single pour size for each beverage would encourage over-pouring of stronger brands.

How do actual drinks compare to standard drinks?

Studies in a number of countries have utilised differing methodologies to estimate or measure the alcohol content of drinks both poured at home and served in bars and restaurants. For example a 1994 Dutch study found that drink sizes were standardised on-premise due to legal requirements (common in Europe) but varied off-premise where they are on average larger than the Dutch standard (12g) (5). A large 1999 Spanish study of both home and on-premise drinks found considerable variation in both and large differences by beverage type. Beer and wine were found to contain about 10g on average but spirits drinks averaged about 20g. Variance was wide for each type and some regional differences were found as well (6). Recent studies in the US have also found variation within and across beverage types and drinking contexts. Home drinks from across the US in 2003 were found to average ethanol content of 12.8g for beer, 15.6g for wine, and 19.6g for spirits drinks (7–8). Bar and restaurant drinks measured in California during 2007 were found to have an average ethanol content of 17g for draught beer, 20g for wine and 18.4g for spirits (9–10). Results of these studies indicated that differences by context, beverage type and sub-type, demographic group and individual can affect the precision and significance of risk estimates. The lack of precision is a factor of the accuracy of the assumptions made about the ethanol content of drinks to the extent that actual drinks differ from the assumed drink. Differences between individuals' measured home drinks were found to be especially large, with a range from 4 to 30g of ethanol, highlighting the potential for measurement error (7–8).

The importance of attention to specific beverages and container or pour sizes can be seen in studies where respondents reported both in terms of "drinks" and these more specific beverages. In a 2008 Australian study more alcohol, and better coverage of known sales, were found from the specific reports (11). Recent studies in countries like India where no standard drink has been defined (or at least is consensually understood), and where drinking practices vary widely by region and beverage type, suggest the importance for accurate measurement of local knowledge of drink types and sizes for accurate alcohol intake assessment (12). This is especially true for risk assessment studies related to alcohol use patterns in such places (13).

Do drinkers know what a standard drink is?

While drink alcohol content is, in a way, a straightforward function of liquid volume and %ABV, the interplay between these and the difficulty most drinkers have in estimating the volume of a glass and knowing the %ABV of their beverage make assessment practically quite difficult. This is most true for spirits, which have a high %ABV such that small differences in volume have a large impact and for which mixed drinks are often made by others. Wine volume can also be difficult to estimate, due to the common use of rounded glassware. Also, wine brands %ABV commonly ranges from 9% to 16% and is not always listed on the container in some countries. Similarly, beer %ABV is often not listed in some countries and can range from 3%ABV to about 10% or higher. Despite this, beer is the most standardised and easiest for drinkers to report because most beer is sold in single serve containers (although these can vary in size) and most drinkers can report the brand they typically or preferentially drink, unlike wine drinkers who may only recall the varietal, region or color, and who may drink a wide variety of wines. We actually know little about the variation over time in individual's beverage and beverage type and brand choices because few studies have used prospective diaries with sufficient detail to capture potential temporal variations (14–15).

A recent review of drink pouring research found a general tendency to over-pour drinks and to underestimate the alcohol content of beverages, especially spirits. Knowledge of drink

sizes was found to be fairly good for beer, although a tendency to over-pour stronger beers and from pitchers was found. There was also generally poor awareness of wine volume pours (16). A 2005 study of US college students found that self-definitions of standard pours were substantially larger than US (14g) standards and that students free-poured larger than standard amounts especially into larger glasses (17). A 1991 Australian study found that while 67% had heard of the 10g Australian standard drink most substantially underestimated the alcohol content of their drinks when only %ABV information was provided (18).

A 2005 US study of both college students and bartenders found that each tended to over-pour a spirits shot into an empty glass, with larger over-pours for short wide glasses (19). However, the hypothesis that larger pours by bartenders would occur when short wide glasses were used was not confirmed in 2007 data from a US study of drinks from 80 bars and restaurants (10). This study did find that larger sized glasses were associated with greater alcohol content drinks. Two studies in Scotland conducted drink pouring exercises using workplace samples. Respondents poured an average of 1.92 units (8g per unit) of wine and 2.3 units of spirits the 2004 study (20) and about 2 units on average for both wine and spirits in the 2007 study (21). Males were also found to pour larger spirit drinks. Comparison of results form the US and Scotland suggests that over-pouring relative to the standard drink or unit may be greater in countries with a small standard drink or unit size. A 1992 pouring study of 356 Australian drinkers interviewed in their homes (22) also reported significant over-pouring of wine, beer and spirits in comparison with standard drinks (10g in Australia). Over-pouring was most marked in males and in younger drinkers. A 1999 study of bar and home wine pours in Australia found that both have larger pours then the Australian standard (23).

Importance standard drinks for safe or low risk drinking guidelines

A 2001 US study of urban pregnant women utilised a ‘vessels’ methodology where respondents select glass and pour level. Large drink pour sizes resulted in much higher volumes when drink-size adjustments were applied as compared to an assumption of uniform drink alcohol content. The authors concluded that drink sizes were a key aspect of alcohol intake and guidelines for pregnant women and others should convey standard drink information (24). Respondents in the 2007 Scottish workplace sample were also asked about their drinking in relation to UK “Sensible Drinking” daily guidelines (up to 3 8g units for women and 4 for men) and 46% said they would exceed UK daily limit while 32% said they would drink within the guidelines (21). Only 20% reported utilising these guidelines to guide drinking.

In a 1988 study patients in general practitioners’ offices in the UK were asked what they thought to be the safe number of units (8g) per day for men and women. Among all respondent groups higher numbers were allowed for men than women and higher numbers of units of beer than wine or spirits were allowed, with about the same ratio of beer to wine and spirits (about 40% more) reported by both genders. Men and heavier drinkers allowed higher limits for both genders (25). The differing numbers of units perceived as allowable by beverage type is interesting here as it suggests that beer was thought to be inherently safer in some way, presumably related to perceptions about its lower alcohol concentration. In a 2009 general population survey of the UK 75% of the sample had heard of daily drinking limits, but only 14% reported keeping track of the number of units they consumed (26).

In a small 2003 Australian study respondents were asked what amount of alcohol per day increased risk of long-term health problems. There was a spread of answers with the most common responses for men divided almost evenly between 3 to 4 (42%) and 5 to 6 (46%), with 5% nominating seven or more Australian standard drinks (10g). For women, the

estimates were much more modest with 60% suggesting 3 to 4 drinks and a total of only 21% suggesting higher levels. There was more diversity in relation to levels believed to increase short-term risks with most common answers for men being 5 to 6, or 7 to 10 drinks and for women 3 to 4, or 5 to 6. The great majority (82%) believed that alcohol in moderation was good for health and around one quarter believed there was a safe level of drinking for pregnant women, with slightly more men than women believing this (27).

Standard drink labeling

Standard drink labeling involves labeling alcohol beverage containers with the liquid volume in terms of a standard drink of that beverage (based on %ABV) and the total number of these drinks in the container. Liquid volume of the beverage and %ABV alone may not be enough information for alcohol intake tracking by many people, especially since studies have found poor knowledge of drink sizes. Standard drink labeling would be more direct and has been shown to improve drinker's performance on intake related tasks. An 1993 Australian study (28) found that subjects using %ABV information (as is currently on many containers) underestimated the number of standard drinks in the container and made large pouring errors, while those using containers with standard drinks labeled made fewer errors on these tasks. Respondents also greatly preferred the standard drink labels. This study was influential in the adoption of standard drink labeling in Australia.

A 1991 Australian study, where 67% of the full sample had heard of a standard drink, included an experiment performed on sub-samples of 52 beer drinkers and 50 wine drinkers in which participants estimated the number of standard drinks (after training and familiarization) in collections of samples of their preferred beverage without and then with a standard drink label. While substantial underestimation of alcohol content occurred without the label the estimates were accurate with the label. Respondents also reported preferring the standard drink label over alternatives expressing content in %ABV, grams and milliliters. (18) In this same study, an experiment on a different sub-sample had drinkers pour a standard drink of their favorite beverage after being taught about the concept first without and then with the standard drink label. Beer drinkers were significantly more accurate with the label but wine drinkers were not. For them, a special marker on the bottle was needed to make wine drinkers more accurate indicating the need to go beyond labeling to enable drinkers to accurately achieve standard pours.

A small 2003 Australian study examined the suitability of existing standard drink labels in terms of visibility and tested ideas about other health messages. Over half (52%) of respondents correctly described the size of a standard drink of their favorite beverage in response to an open-ended question, although only 29% of wine drinkers could do so. There was considerably more overestimation of the size of a standard drink than underestimation. The median time for locating a standard drink label on the bottle was six seconds, although generally respondents either found it immediately or took considerably longer (up to 48 seconds). A large majority (80%) said they would support the label being three times larger (27).

Studies have also indicated some difficulties that may result from poorly designed labels and others that may be inherent to the provision of accurate information. If labels encourage the consumption of spirits drinks over beer, as has been found in a recent study of a particular label (29), by falsely giving the impression that spirits drinks have the same alcohol content and lower calories, these labels could have an effect opposite to that intended (helping drinkers to moderate their consumption) by increasing unsafe drinking and calorie intake from alcoholic beverages. Such a shift is likely to be problematic because evidence on calorie and alcohol intake from US research on both home drinks and those sold in bars and

restaurants indicates that actual wine and spirits drinks have the most alcohol and calories (9, 30–31). Where drinkers are strongly motivated by intoxication, labeling may facilitate these intentions. A recent Australian focus group study of students found that while they were aware of standard drink labels they reported sometimes using them to find the strongest drinks (32). How common this use of labels is in unknown, as is whether students actually drink more with better information, but this research does highlight the importance of potential unintended uses of information provided to encourage safer drinking practices.

Discussion

It is clear that there are significant difficulties with the clear communication of equivalent "units" of alcohol consumption such as are required both when assessing individual alcohol consumption in a research and/or clinical setting and when providing advice on low risk consumption levels. There is a large and increasing variation in the strengths of all major varieties of alcoholic beverage as well as substantial variation in amounts poured in different contexts both within and across different countries. The arithmetical difficulty of converting alcohol consumption into the normal currency of drinking guidelines (standard drinks or units) may deter even those who are interested in checking whether they are in adherence. Motivation to adhere to drinking guidelines is likely quite weak in many people's drinking exceeds the limits and lack of clarity in their communication further compounds this difficulty.

In response to this barrier, the concept of a standard drink or unit of alcohol has been frequently employed in surveys, which is usually illustrated with examples of typical sizes and strengths of popular beverages. There is evidence from survey and simulated drinking studies that this concept is not straightforward to apply without the inclusion of additional labels on alcohol containers. More specifically, there is evidence that providing standard drink labels assists drinkers to accurately assess the alcohol content of various beverages and hence should assist them in adhering to low risk drinking guidelines should they wish to do so. Taking this concept one step further, labels could also include the relevant countries drinking guidelines in terms of the volume of the beverage in the container. In relation to evidence from the Australian focus group study (32) that some young drinkers report using standard drink labels to select stronger alcoholic beverages, the analogy of providing speedometers in cars to help drivers adhere to driving limits is perhaps instructive. While some drivers use speedometers to see how fast they can drive this is not an argument for removing speedometers and hence disabling many other drivers from monitoring their driving speed for safety or simply to comply with the law.

Existing research provides some basis for recommending that countries adopt a standard drink or unit with an alcohol content similar to widely consumed beverages. The usefulness of this measure can be facilitated through standard drink labeling which provides the volume of a standard drink or unit of the beverage, the number of these in the container and the %ABV. Further, additional education strategies may be aid drinkers in implementing standard pours. Providing an accurate measuring device, including such a device on the container (the cap on a spirits bottle) and encouraging drinkers to practice pouring in their own usual glassware are examples of potential strategies.

The majority of existing research on the topics presented in this review was conducted in developed English speaking countries. Similar studies from other countries is especially needed to demonstrate the relevance of these concepts in other societies and to understand the particular issues around drink alcohol content, labeling aspects of these unique to each national situation. Many of the topics presented included only a few small studies of particular populations, indicating a need for larger general population studies.

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