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A dynamic splash of golden-yellow liquid, likely beer or wine, is captured in mid-air against a white background. The splash originates from the left and moves towards the right, with numerous droplets and a main stream of liquid. The bottom portion of the splash is partially obscured by a large red curved shape.

Alcohol and obesity:

A systematic review scoping study

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About the Centre for Alcohol Policy Research

The Centre for Alcohol Policy Research (CAPR) is a world-class alcohol policy research institute, led by Professor Robin Room. The Centre examines alcohol-related harms and the effectiveness of alcohol-related policies. CAPR is a joint undertaking of the Victorian Government, the University of Melbourne, Turning Point Alcohol and Drug Centre and the Foundation for Alcohol Research and Education (FARE). It operates as one of Turning Point's research programs, with core funding from FARE.

CAPR not only contributes to policy discussions in Australia but also contributes to international studies of significance for the World Health Organization. An example of its international work is the [GENACIS project](#), which examines gender alcohol and culture internationally.

The Centre has also undertaken a pioneering study, The [Range and Magnitude of Alcohol's Harm to Others](#), that is the cost of alcohol-related harms on people other than the drinker, otherwise referred to as third party harms. Results from the study were also included in the World Health Organization's [Global Status Report on Alcohol and Health 2011](#), and WHO is using the study as a model for such studies globally.

About the Foundation for Alcohol Research and Education

FARE is an independent charitable organisation working to prevent the harmful use of alcohol in Australia. Our mission is to help Australia change the way it drinks by:

- helping communities to prevent and reduce alcohol-related harms;
- building the case for alcohol policy reform; and
- engaging Australians in conversations about our drinking culture.

Over the last 11 years FARE has have invested more than \$115 million, helped 800 organisations and funded over 1,500 projects addressing the harms caused by alcohol misuse.

FARE is guided by the World Health Organization's [Global Strategy to Reduce the Harmful Use of Alcohol](#) for addressing alcohol-related harms through population-based strategies, problem-directed policies, and direct interventions.

If you would like to contribute to FARE's important work, call us on (02) 6122 8600 or email fare@fare.org.au. All donations to FARE over \$2 are tax deductible.



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Background

In February 2013 researchers at the Centre for Alcohol Policy Research were requested by FARE to undertake “a systematic review of the interplay of alcohol and obesity”. Background correspondence between FARE and the Australian National Preventative Health Agency (ANPHA) in late 2012 had previously narrowed that brief to a concern with the energy intake from alcohol and how this contributes to the overweight and obesity problem in Australia. ANPHA recognised that alcohol is an energy dense/nutrient poor ‘food’, one of the targets of their obesity campaigns.

This clarification of the scope is important because in addition to the epidemiological relationship between alcohol intake and indicators of excess body weight, alcohol and obesity can also interact synergistically in relation to disease prevalence. For example, co-occurrence of obesity and excessive drinking may place adults at an increased risk for liver disease (1-3), a higher risk of colorectal cancer (4, 5), or a higher risk of hepatocellular cancer (6, 7). Professor Ian Caterson, the chair of ANPHA’s Expert Committee on Obesity, has also noted in correspondence with FARE that there was the issue of additional energy consumed when drinking, a relationship which has been discussed in a recent meta-analysis (8). However this scoping study is not addressing these concerns and focuses on the association between alcohol consumption and indicators of body weight, such as body mass index (BMI), and/or abdominal adiposity (such as waist circumference (WC) or waist-to-hip ratio (WHR)).

A systematic review aims “to identify, evaluate and summarise the findings of all relevant individual studies, thereby making the available evidence more accessible to decision makers” (9:v). Such a review adheres to a strict scientific design based on explicit and reproducible methods. However before embarking on a systematic review it needs to be clarified whether there are any existing systematic review(s) and whether a new review is justified. The current scoping study addresses whether there are existing systematic reviews examining the association between alcohol consumption and body weight and/ or abdominal adiposity and, if so, assesses the systematic review(s).

At the end of the study, I make recommendations for future research based in the first instance on any identified systematic reviews, and secondly on a broader understanding of the alcohol and obesity fields.



Methods

Search strategy for existing systematic reviews of alcohol and obesity

A literature search was conducted in the following databases to the end of February 2013: Cochrane database of systematic reviews, Database of abstracts of reviews of effects (DARE), Campbell Collaboration Library of Systematic Reviews, Medline, PubMed, EMBASE, CINAHL, SCOPUS, and Web of Knowledge. These databases were selected on the basis of their use in existing obesity systematic reviews and alcohol systematic reviews.

The search strategy used the following terms: obesity OR overweight OR body mass index OR BMI OR waist OR adiposity OR body fat OR weight AND alcohol AND systematic review. These search terms were obtained by identifying the search terms used in existing obesity systematic reviews and alcohol systematic reviews.

Depending on the database in question, the search was either restricted to 'title', 'abstract', 'keywords', or 'topic' (which in Web of Knowledge refers to title, abstract, author keywords, and Web of Knowledge selected keywords). In the Cochrane database a search limit of 'full systematic reviews' was selected. In Web of Knowledge 'systematic review' had to be present in the title.

Two relevant systematic reviews were identified (10, 11). The first of these examined the effects of alcohol consumption on body weight, while the second looked for evidence linking beer consumption to abdominal and general obesity. Articles which have cited the 2011 article were also reviewed, whereas there were no articles identified which have cited the 2013 article. One systematic review was identified in which alcohol was a keyword, but it provided information about the 'Mediterranean diet' as a whole (which would include consideration of moderate red wine consumption with meals) rather than any information about alcohol on its own, and it was not considered any further (12).

Results

Assessment of existing systematic reviews

The two relevant systematic reviews were assessed to determine whether they were of sufficient quality to decide whether a further systematic review is justified at this time. The Centre for Reviews and Discussion (9:4) has provided a detailed checklist to guide a critical appraisal of systematic reviews and the results of completing this appraisal are provided overleaf, in Table 1.



Table 1: Assessment of existing systematic reviews linking alcohol consumption with body weight and/or abdominal adiposity

Assessment criteria of systematic reviews	Sayon-Orea et al (2011)	Bendsen et al (2013)
Research question	Effects of alcohol consumption on body weight	Evidence linking beer consumption to abdominal and general obesity
Was the review question clearly defined in terms of population, interventions, comparators, outcomes and study designs?	Human (included studies with adolescents) Minimal clinically important differences Search terms identified The review aimed to identify articles reporting on cross-sectional, prospective cohort, and intervention trials examining alcohol intake and weight gain or obesity	Adult men/women Not alcoholic or hospitalised patients No study design restrictions Search terms identified The aim was to include all available cohort, case-control, cross-sectional, and experimental studies describing the association between consumption of beer (amount and/or frequency) and an obesity measure
Was the search strategy adequate and appropriate? Were there any restrictions on language, publication status or publication date?	Medline Published reports from reference lists of articles English and Spanish 1984 to March 2010	Medline, EMBASE, CSA, Web of Science; Reference lists from studies and review articles No language restrictions 1950 to November 2010
Were preventative steps taken to minimize bias and errors in the study selection process?	None identified	Two reviewers independently selected articles eligible for further review Second screening was based on reading of the full-text versions, with any disagreement between reviewers resolved by consensus
Were appropriate criteria used to assess the quality of the primary studies, and were preventative steps taken to minimise bias and errors in the quality assessment process?	Hierarchical rating of research design from Level I (best) to Level III (worst) (Table 1); Grading of internal validity of individual studies (Table 2) 1 'Level I Good' study 1 'Level I Fair' study 2 'Level II-1 Fair' studies 10 'Level II-2 Good' studies 3 'Level II-2 Fair' studies 14 'Level III Good' studies 2 'Level III Fair' studies	Generally the study quality of the eligible experimental studies was low (see Table S1 in the Supporting Information for this article available online). Blinding was either not performed or was inadequately addressed in all studies. The description of concurrent diet and energy intake and physical activity was inadequate in most studies



Assessment criteria of systematic reviews	Sayon-Orea et al (2011)	Bendsen et al (2013)
Were preventative steps taken to minimise bias and errors in the data extraction process?	Not relevant	Used Cochrane Collaborations tool for assessing risk of bias
Were adequate details presented for each of the primary studies?	Table 3 appears comprehensive, but is further assessed when checking the systematic reviews conclusions (see below)	Table 1 appears comprehensive, but is further assessed when checking the systematic reviews conclusions (see below)
Were appropriate methods used for data synthesis? Were differences between studies assessed? Were the studies pooled, and if so was it appropriate and meaningful to do so?	This study adopted a narrative synthesis approach. Narrative synthesis “is the adoption of a textual approach that provides an analysis of the relationships within and between studies and an overall assessment of the robustness of the evidence” (CRD:48). None of the four intervention studies were referenced in the discussion or conclusions and therefore played no effective role in the findings	This study considered a meta-analysis but data pooling was not considered feasible owing to considerable variability in and incompleteness of data presentation in individual studies In the end it was a narrative synthesis rather than meta-analysis
Do the authors’ conclusions accurately reflect the evidence that was reviewed?	Check systematic reviews conclusions (see below)	Check systematic reviews conclusions (see below)

Check systematic review conclusions – Sayon-Orea et al (2011)

Sayon-Orea et al (2011) (hereafter referred to as Sayon-Orea) classified the studies on the basis of whether they were cross-sectional or prospective cohort, and whether they were examining the association with body weight (for example, body mass index) or with measures of abdominal adiposity (waist circumference or waist to hip ratio). Excluding the two cross-sectional studies of adolescents, I re-examined the remaining 14 cross-sectional studies. Similarly excluding the two prospective cohort studies based on adolescents, I re-examined the remaining 11 prospective cohort studies. None of the four intervention studies identified were referenced in their Discussion or Conclusions and therefore played no effective role in the findings.

Sayon-Orea identified four conclusions, as extracted from their Conclusion and quoted below:



1. It is currently unclear whether alcohol consumption is a risk factor for weight gain because studies performed to date have found positive, negative, or no associations.
2. A positive association was seen more frequently in men than in women (although this was extracted from their Discussion rather than the Conclusion).
3. Since the positive associations between alcohol and weight gain were mainly found in studies with data on higher levels of drinking, it is possible that an effect on weight gain or abdominal obesity may only be experienced by heavy drinkers.
4. Light-to-moderate alcohol intake, especially of wine, may be more likely to protect against, rather than promote, weight gain, whereas intake of spirits has been positively associated with weight gain.

This conclusion has been further separated into conclusions about light-to-moderate alcohol intake and beverage type:

- a. Light-to-moderate alcohol intake may be more likely to protect against, rather than promote, weight gain.
- b. Wine may be more likely to protect against, rather than promote, weight gain, whereas intake of spirits has been positively associated with weight gain.

I examined each of these conclusions to answer “do the authors’ conclusions accurately reflect the evidence that was reviewed?” Table 2 adopts the reference numbers from Sayon-Orea but the assignment of studies in the table is based on my fresh examination of the studies.

Table 2: Appraisal of Sayon-Orea Conclusions 1 and 2

Type of study	Positive association – men	Positive association – women	Negative association – men	Negative association – women	No (or insignificant) association – men	No (or insignificant) association – women
Cross-sectional – body weight	6 studies (23, 25, 27, 28, 30, 34)	3 studies (23, 25, 34)	3 studies (24, 25, 32)	7 studies (24, 25, 32, 33, 35, 38, 39)	5 studies (31, 33, 34, 38, 39)	3 studies (28, 31, 34)
Prospective cohort – body weight	2 (37, 47)	1 (42)	1 (39)	2 (39, 49)	1 (38)	2 (38, 45)
Cross-sectional – abdominal adiposity	3 (30, 34, 36)	2 (30, 34)	0	0	0	1 (35)
Prospective cohort – abdominal adiposity	2 (40, 43)	2 (40,43)	0	1 (44)	3 (40, 41, 44)	1 (40)
TOTAL	13	8	4	10	9	7



The re-examination of the references resulted in a slightly different assignment of studies into the above table compared to Sayon-Orea's, but this did not alter the findings. Overall there were 21 studies that showed a positive association, 16 studies showed a negative association, and 14 studies showed no association. The spread of findings was observed whether considering cross-sectional or prospective cohort studies, or body weight or abdominal adiposity outcomes. Although it appears from a small number of cross-sectional studies that there is a greater likelihood of a positive association with abdominal adiposity (5 studies positive to 1 study negative), this finding is not repeated in the prospective cohort studies (4 studies positive to 4 studies negative and 1 study no association).

Table 3: Appraisal of Sayon-Orea Conclusions 3, 4(a) and 4(b)

Type of study	YES: Effect on weight gain or abdominal adiposity only experienced by heavy drinkers (Conclusion 3)	NO: Effect on weight gain or abdominal adiposity NOT only experienced by heavy drinkers (only considering studies where heavy drinking levels were explicitly considered)
Cross-sectional	7 studies 23, 25, 27, 28, 30, 34, 36	1 study 24
Prospective cohort	3 studies 40, 42, 47	5 studies 39, 40, 41, 44, 49
TOTAL	10	6
Type of study	YES: Light-to-moderate alcohol intake is protective against weight gain (Conclusion 4(a))	NO: Light-to-moderate alcohol intake is protective is NOT supported by study
Cross-sectional	3 studies 23, 24, 34	1 study 28
Type of study	YES: Wine consumption is protective against weight gain but spirits consumption leads to weight gain (Conclusion 4(b))	NO: That wine consumption is protective against weight gain but spirits consumption leads to weight gain is NOT supported by this study
Cross-sectional	2 studies 34, 43	2 studies 30 (beer and spirits lead to more weight gain than wine) 40 (beer and wine led to weight gain but wine did not, which is not the same as saying wine is protective)



Conclusion 1: It is currently unclear whether alcohol consumption is a risk factor for weight gain because studies performed to date have found positive, negative, or no associations. **Sustained**

Overall, for men, the studies are evenly balanced between positive (13) and “negative or no” (13) associations. For women only a third of the studies show a positive association (8), whereas two thirds show a “negative or no” (17) association.

Conclusion 2: A positive association was seen more frequently in men than in women. **Sustained**

When referring to Table 3, there are 10 studies (7 cross-sectional and 3 prospective cohort) that found that the association of weight gain or abdominal adiposity with heavy drinking is positive. There are six studies (1 cross-sectional and 5 prospective cohort) that included a measure of heavy drinking that found either negative or no association between weight gain or abdominal adiposity and heavy drinking. To account for the possibility that a negative or no association between alcohol consumption and weight gain or abdominal adiposity and alcohol consumption arose because the investigators did not examine measures of heavy drinking, the original studies were re-examined and those that did not have heavy drinking measures (33, 37) or were not clear (32, 35, 38) were excluded from the summary in Table 3.

Although the evidence supports Sayon-Orea’s conclusion that “an effect on weight gain or abdominal obesity may only be experienced by heavy drinkers”, it needs further qualification. Sayon-Orea (10:428) notes “prospective studies are better protected against inverse causation bias and can provide stronger evidence, making them better candidates for scrutiny.” In Table 3, the prospective cohort studies do not support the conclusion, although based on a smaller number of studies. One study appears in both columns based on different findings for different beverage types (Yes for spirits, No for wine).

Conclusion 3: Since the positive associations between alcohol and weight gain were mainly found in studies with data on higher levels of drinking, it is possible that an effect on weight gain or abdominal obesity may only be experienced by heavy drinkers. **Not sustained as the smaller number of prospective cohort studies do not support it.**

When referring to Table 3, the conclusion that light-to-moderate alcohol intake is protective against weight gain has been made based on a very small number (4) of studies and this level of evidence is considered insufficient.

Conclusion 4(a): Light-to-moderate alcohol intake may be more likely to protect against, rather than promote, weight gain. **Not sustained as evidence insufficient.**

When referring to Table 3, the conclusion that wine consumption is protective against weight gain but spirits consumption leads to weight gain needs to be disentangled from the conclusion about light-to-moderate drinking and could be better expressed as beer and spirits consumption lead to more weight gain than wine, with some studies showing a protective effect of wine. Sayon-Orea



provides several possible explanations for this finding based on literature that is not part of the systematic review. However there are two studies that support this finding and two studies that do not, i.e. the results are contradictory. Furthermore the very small number of studies is insufficient to draw a conclusion.

Conclusion 4(b): Wine may be more likely to protect against, rather than promote, weight gain, whereas intake of spirits has been positively associated with weight gain. **Not sustained as evidence insufficient and contradictory.**

Summary of appraisal of Sayon-Orea conclusions

1. It is currently unclear whether alcohol consumption is a risk factor for weight gain because studies performed to date have found positive, negative, or no associations. **Sustained**
2. A positive association was seen more frequently in men than in women. **Sustained**
3. Since the positive associations between alcohol and weight gain were mainly found in studies with data on higher levels of drinking, it is possible that an effect on weight gain or abdominal obesity may only be experienced by heavy drinkers. **Not sustained as the smaller number of prospective cohort studies do not support it**
4. Light-to-moderate alcohol intake, especially of wine, may be more likely to protect against, rather than promote, weight gain, whereas intake of spirits has been positively associated with weight gain.
 - a. Light-to-moderate alcohol intake may be more likely to protect against, rather than promote, weight gain. **Not sustained as evidence insufficient**
 - b. Wine may be more likely to protect against, rather than promote, weight gain, whereas intake of spirits has been positively associated with weight gain. **Not sustained as evidence insufficient and contradictory**

Check articles citing Sayon-Orea

Only two articles that cited Sayon-Orea in the time frame considered (end February 2013) contributed new observational data. The first found that current and lifetime alcohol consumption were positively associated with overall and central obesity, in both women and men (13) thereby adding one study to the list of those reporting a positive association for both men and women in Table 2.

The second study reported that postmenopausal women of normal weight who reported moderate alcohol intake have a reduced risk of becoming overweight or obese over time. Wine consumption showed the greatest protective association for risk of overweight (14). This study contributes to the findings about the protective effects of moderate alcohol consumption and the greater protection afforded by wine consumption, thereby contributing to Sayon-Orea's Conclusions 4(a) and (b).



The other articles citing Sayon-Orea were reviews rather than new research.

Check systematic review conclusions – Bendsen et al (2013)

Bendsen et al (2013) (hereafter referred to as Bendsen) searched for articles that reported the association between consumption of beer (amount and/or frequency) and an obesity measure, including body weight (BW), body mass index (BMI), waist circumference (WC), waist to hip ratio (WHR), body fat mass or percentage and/or body fat distribution. Thirty-five observational studies and 12 experimental studies met the selection criteria and were included in the review. Of the 35 observational studies, 10 were prospective cohort studies, and 25 were cross-sectional studies.

Before identifying their conclusions Bendsen noted three major qualifications of their findings: that few of the studies found eligible for inclusion in the review were designed to assess whether beer intake was associated with obesity; results were inconsistently presented across studies; and most experimental studies were of low quality.

Notwithstanding those qualifications, Bendsen identified five major findings in their Results section:

1. The majority of studies either showed a positive or no association between beer intake and general or abdominal obesity.
2. In women, several studies indicated a negative association with general obesity and none a positive association, whereas findings regarding abdominal obesity were conflicting.
3. In men, most studies found either no or a positive association with both general and abdominal obesity.
4. The limited data [on studies which reported obesity-related outcomes across different beer intake categories] did not point towards a dose-response relationship between beer intake and general or abdominal obesity, or towards prospective changes in obesity indices at lower or moderate intake levels (less than ~500 mL/day).
5. It appears that high beer intakes (more than ~ 4L/week) may be associated with a higher degree of abdominal obesity, particularly among men, whereas the picture for general obesity is less clear.

Findings (4) and (5) resulted in the study's two conclusions in the Conclusions section:

1. The present data provide inadequate scientific evidence to assess whether beer intake at moderate levels (<500 mL/ day) is associated with general or abdominal obesity.
2. It cannot be excluded, however, that higher intake levels [more than ~4L/week] may be positively associated with obesity, particularly abdominal obesity.

I examined both of these conclusions, as well as findings (1) to (3) to answer “do the authors’ conclusions accurately reflect the evidence that was reviewed?”

Bendsen tabulated their findings by: type of study (cross-sectional or prospective cohort); gender (women, men, women and men); obesity measure (general obesity (BMI/BW), abdominal obesity



(WC/WHR); and the association results (positive, no, negative). An association was considered to be not statistically significant if $0.05 > p < 0.10$. The findings presented in their Table 2 were re-examined against the summaries provided in their Table 1 and were found to be an accurate representation. The following discussion uses the findings presented in their Table 2 and re-tabulated below in Table 4.

Table 4: Appraisal of Bendsen Findings (1) to (3)

Finding (1) from Bendsen Results section	Based on Table 2 of Bendsen	Appraisal of, or recommended wording for, findings
The majority of studies either showed a positive association between beer intake and general or abdominal obesity, or	Women (6), Men (14), Women and men (3), Total = 23	Sustained
no association between beer intake and general or abdominal obesity.	Women (12), Men (14), Women and men (1), Total = 27	Sustained
	Women (9), Men (3) Total = 12	A smaller but still important number of studies (12) found a negative association between beer intake and general or abdominal obesity
Finding (2) from Bendsen Results section		
In women, several studies indicated a negative association with general obesity	Women: 4, 18, 25, 27, 29, 39 = 6 (compared to three for abdominal obesity)	For women, in the association between beer consumption and general obesity, none of the studies showed a positive association and the relationship was evenly spread between a negative association (6 studies) or no association (5 studies)"
and none a positive association		Sustained
whereas findings regarding abdominal obesity were conflicting		For women, when abdominal obesity is considered there is a group of studies finding a positive association (6 studies). However the studies finding no association (10 studies) or a negative association (3 studies) still dominate.
Finding (3) from Bendsen Results section		
In men, most studies found either no association with either general or abdominal obesity, or	Men (18)	Sustained
a positive association with either general or abdominal obesity.	Men (19)	Sustained



From the Results in Table 4 it can be concluded that overall the majority of studies either showed a positive association between beer intake and general or abdominal obesity (23 studies), no association between beer intake and general or abdominal obesity (17 studies), or a negative association (12 studies). Leaving aside the question of the amount of beer consumed (the dose-response relationship discussed further below), from these results it can be agreed that “the present data provide inadequate scientific evidence to assess whether beer intake is associated with general or abdominal obesity.”

However this fails to capture some of the gender-specific results which found that for women, in the association between beer consumption and general obesity, none of the studies show a positive association and the relationship is evenly spread between a negative association (6 studies) or no association (5 studies). However, when abdominal obesity is considered there is now a group of studies finding a positive association (6 studies), but the studies finding no association (10 studies) or a negative association (3 studies) still dominate.

In men, most studies find either no association (18 studies) or a positive association (19 studies) with both general and abdominal obesity, whereas there are very few studies (3 studies) finding a negative association. Thus for women no or negative association dominates, whereas for men positive or no association dominates.

*Where there is a positive association it is more likely to be for abdominal adiposity than general obesity for men and women. **This is a new conclusion***

When considering the dose-response relationships, from the initial data set of 25 cross-sectional and 10 prospective cohort studies, data from 11 cross-sectional and 3 prospective studies allowed for examination of dose-response relationships. The findings of the cross-sectional studies are presented graphically in Figure 2 in Bendsen and of the prospective cohort studies in Figure 3. When re-examining the findings presented in Bendsen Figures 2 and 3 for moderate beer intakes, the data supports the inconclusiveness expressed as follows:

Conclusion 1: The present data provide inadequate scientific evidence to assess whether beer intake at moderate levels (<500 mL/ day) is associated with general or abdominal obesity. **Sustained**

When re-examining the findings presented in Bendsen Figures 2 and 3 for higher beer intakes (more than ~4L/week), there are only five studies for men and one for women that examine this beer intake level, and it is not defined what qualifies as “a higher degree of abdominal adiposity.”

Conclusion 2: It appears that high beer intakes (more than ~4L/wk) may be associated with a higher degree of abdominal obesity, particularly among men, whereas the picture for general obesity is less clear. **Not sustained as evidence may be insufficient and conclusion lacks clarity**



Conclusions

The conduct of a systematic review searching for existing systematic reviews linking alcohol with obesity identified two candidates, both recent. On the basis of a rigorous appraisal of these two existing systematic reviews, it is not recommended that a further systematic review of the relationship between alcohol consumption and body weight or abdominal adiposity measures be performed.

Appraisal of the evidence presented in both systematic reviews results in four conclusions:

1. It is unclear whether alcohol consumption is a risk factor for weight gain because studies performed to date have found positive, negative, or no associations.
2. Where there is a positive association between alcohol and body weight it is more likely to be found in men than in women.
3. The present data provide inadequate scientific evidence to assess whether beer intake is associated with general or abdominal obesity.
4. When considering beer, where there is a positive association it is more likely to be for abdominal adiposity than for general obesity for men and women.

The first conclusion had also quite recently been made in a (non-systematic) review of the relationship between alcohol intake and body weight in epidemiologic studies, which identified 34 studies in which there was a positive association, 12 studies in which there was no association, and 21 studies in which there was a negative association (15:209).

The other conclusions made by the systematic reviews, mainly relating to the association between measures of body weight or abdominal adiposity and, on the one hand, levels of consumption (the dose-response studies), or, on the other hand, the type of beverage, are based on insufficient evidence, or evidence which is supported by cross-sectional studies but not by prospective cohort studies. At this time, there is insufficient evidence to justify further conclusions.

Implications for policy

The lack of a connection between levels of alcohol consumption and obesity means that policies to control obesity and policies to control drinking in the population are each needed in a public health approach to behavioural risk factors. It cannot be expected that policies effective in controlling obesity will have much effect on drinking, and vice versa.

However there is good reason to give consumers the kind of information about energy content (calories/kJ) on the label of alcoholic beverages that they get for every other foodstuff. But the fundamental justification for this is in terms of consumer rights rather than as a contribution to policy on obesity.



Recommendations for future research

Based on Sayon-Orea and Bendsen

Sayon-Orea (10:429) identified three areas in which future research might contribute to a greater understanding of the conflicting evidence: the roles of different beverage types; the effect of consumption patterns; and the subjects' previous tendency to gain weight.

It was partly in response to the recommendation to assess the roles of different types of beverages that Bendsen undertook their systematic review of the association between beer consumption and abdominal and general obesity. However Bendsen identified significant limitations in the studies that they reviewed. In particular they noted that “few of the studies found eligible for inclusion in this review were designed to assess whether beer intake is associated with obesity; results were inconsistently presented across studies; and most experimental studies were of low quality” (11:85). To address this they recommended undertaking an appropriate study to definitively determine whether beer consumption plays a causal role in abdominal and general obesity. While they noted that there were inherent ethical challenges in such an undertaking, in their opinion it was not an ethical problem to supply subjects with an amount that was below the recommended upper level for alcohol consumption.

Systematic reviews of the association between wine consumption and spirits consumption and abdominal and general obesity are recommended to complement Bendsen's work on beer, and any future more dedicated studies on beer. While, as previously mentioned, wine has been reviewed as part of the Mediterranean diet (12), this did not identify the effects of wine on its own.

Sayon-Orea recommended further research should take the effect of consumption patterns into account, especially as their tentative, but effectively unsustainable, conclusions relate to the impact of heavy versus light-to-moderate drinking on the association with obesity. They are recommending research not only on the volume of drinking but also the pattern of drinking.

Sayon-Orea also recommended evaluation of the subjects' previous tendency to gain weight, identifying it as a potential effect modifier that has not been evaluated before but might be important.

Beyond Sayon-Orea and Bendsen

While Sayon-Orea considers the three major alcohol types – beer, wine and spirits – and recommends future research based on these classifications, a further area of interest would be to consider the combined effects of alcohol and various kinds of sugar, e.g. alcopops, cider, shandy etc. and their relationship with abdominal or general obesity. Another area of interest would be the combination of alcohol and caffeine and the effect on obesity.



In their recommendations for further research, neither Sayon-Orea nor Bendsen emphasised the need to take account of gender, cultural background, age or socioeconomic status in increasing our understanding of the relationship between alcohol consumption and obesity. How these factors play out could form the basis of qualitative studies designed to elucidate behavioural motivations and environmental factors. For example, such studies could examine whether women use alcohol, in particular wine, as a weight management tool which would contribute to explanations about the lack of an association between light-to-moderate wine consumption and weight gain.

The concentration on obesity as the risk factor of interest, while understandable from a policy viewpoint given the political prominence given to obesity in recent years, obscures the contribution that consideration of the association between alcohol consumption – whichever type, volume, pattern, or by whom – and other markers of the metabolic syndrome might make. Abdominal obesity is one of five risk factors along with elevated triglycerides, low high-density lipoprotein cholesterol, elevated blood pressure, and elevated fasting glucose that together make up the metabolic syndrome. The presence of any three factors in the syndrome predicts the development of chronic diseases, such as cardiovascular disease and type 2 diabetes, to an even greater degree than obesity alone, and abdominal obesity does not have to be present to experience the metabolic syndrome (16, 17). Future research could look for the association between alcohol consumption and the metabolic syndrome. No systematic reviews on the topic were identified although there have been reviews of the relationship between alcohol consumption and burden of disease (18, 19).

This scoping study and associated recommendations for future research have been oriented towards epidemiological research. As Sayon-Orea notes (10:428) there are two other approaches: psychophysiological investigation (alcohol and appetite regulation), and metabolic studies (effects of alcohol intake on energy expenditure and substrate oxidation). These types of studies also need pursuing but no specific recommendations can be made based on the review undertaken.



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