



Reducing Alcohol – Your Breast Bet

M. Silvester, M. Sutaroski & K. Christensen
University of Ottawa, Interdisciplinary School of Health Sciences



uOttawa

Abstract

Background: Last year an estimated 14 women died every day from breast cancer (1). A common misconception among women is that the diagnosis is beyond their control; therefore, more research and dissemination is required to contest this misbelief and encourage women to play a more active role in their health (2). **Objective:** To summarize relevant literature and critically assess the evidence indicating an association between moderate alcohol consumption and breast cancer risk. **Methods:** A systematic review was conducted using the Scholars Portal database and findings were restricted to published articles from 1995-2015. The search was performed using the keywords “alcohol consumption” AND “breast cancer risk” and a total of 8 articles were selected based on specific inclusion and exclusion criteria. **Results:** Upon review of the articles, 7 found a definitive link between moderate alcohol consumption and increased risk of breast cancer. The general consensus of moderate alcohol consumption equated to 20-30g/day, which is roughly 1.5-2 alcoholic drinks. One study found that alcohol consumption as low as 5g/day (½ of an alcoholic drink) increased breast cancer risk. **Conclusion:** The findings indicated there was a statistically significant relationship between moderate alcohol consumption and increased risk for breast cancer. Discordance, however, does exist among which characteristics of alcohol consumption play the biggest role in increasing risk, with some noting average quantity, intensity, or timing and age as the most important risk factor; therefore, warranting further investigation.

Research Question

Does moderate alcohol consumption increase the risk of developing breast cancer among adult women?

Introduction

Breast cancer is the most prevalent cancer among Canadian women, accounting for 26% of diagnosed cancer cases in 2014 (1). Despite increased funding and research efforts, in addition to a strong emphasis on preventative screening measures many Canadian women face both personal and systemic barriers to accessing methods of early detection (2). Furthermore, the number of women accessing breast-screening services has

started to decline, which could be a result of prevailing attitudes among women that breast cancer is inherited and simply beyond their control (2,3). Epidemiological studies have suggested a possible link between moderate alcohol consumption and increased risk for developing breast cancer; however, research remains unclear in regards to the intensity and frequency of alcohol consumption that is related to an observable increase in risk. Additionally, the research surrounding specific types of alcohol and breast cancer risk remains inconclusive; therefore, more detailed research is required on the subject for its integration into evidence-based practice. Alcohol consumption, unlike female gender, genetic predisposition and BCRA gene mutations, is a modifiable lifestyle factor that can be, for the most part, successfully altered (4). Moving forward, providing a consistent health message to the general public regarding alcohol as a risk factor for breast cancer is of the utmost importance.

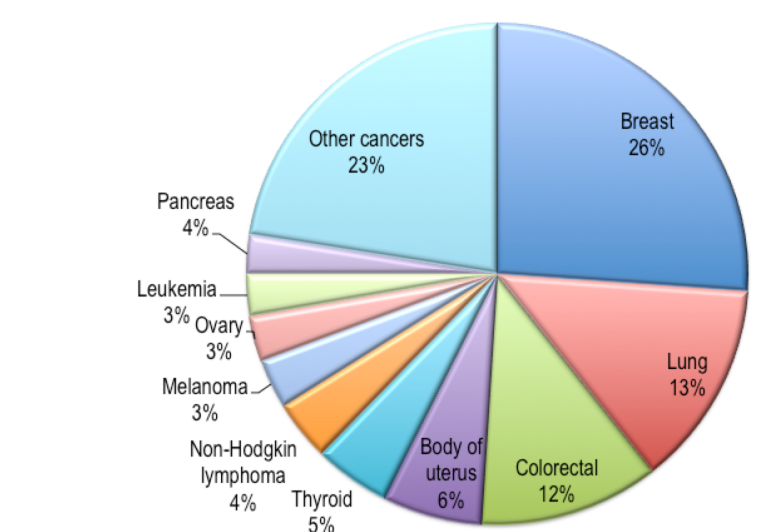
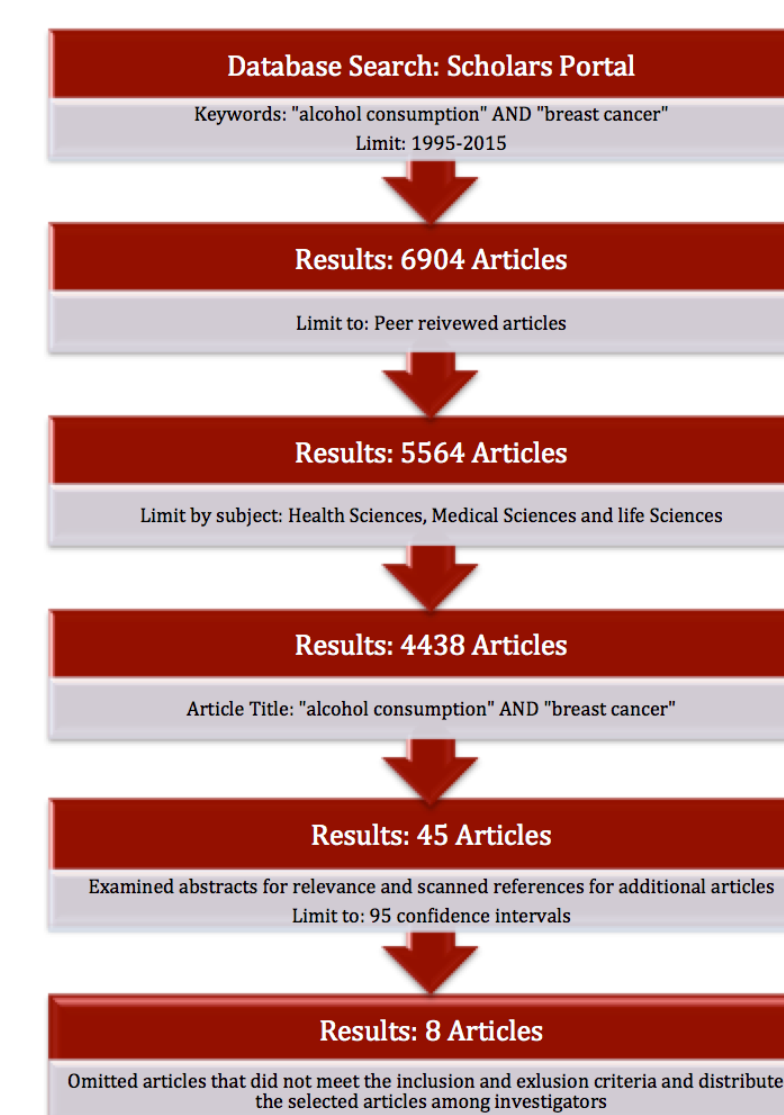


Figure 1. Percent Distribution of Estimated New Cancer Cases, for Females, Canada 2014 (Canadian Cancer Statistics, 2014)

Methods

A search of the Scholars Portal database, a multi-disciplinary resource for peer-reviewed literature, was used to conduct a systematic review examining alcohol consumption and the risk of developing breast cancer. A systematic search was conducted using the terms “alcohol consumption” AND “breast cancer,” which resulted in over 6000 articles in total. As a means to narrow electronic findings, the search was limited by date and subject; with an emphasis on peer-reviewed literature published between 1995-2015, in Health Sciences, Medical Sciences and Life Sciences E-journals. Due to a relatively large number of electronically identified articles the search was restricted to “alcohol



consumption” AND “breast cancer” within the article title, which yielded 45 potentially relevant articles. When appropriate, a revision of references was conducted to find additional articles. The final selection of articles was based on the assessment of relevant abstracts and the application of specific exclusion and inclusion criteria. Eight articles were subject to analysis by 3 investigators. Each investigator constructed a synthesis matrix for the purpose of analyst triangulation

Data Extraction

The selected articles were distributed among 3 investigators for individual analysis to identify:

- Purpose
- Methods and statistical analyses
- Outcome measures
- Quantification of alcohol consumption
- Potential confounders
- Results
- Strengths and limitations

Inclusion Criteria

- Origin of study
- Observational study design
- Gender
- Presence of outcome
- 95% confidence intervals

Exclusion Criteria

- Animal or cell culture studies
- Examination of co-morbidities

Results

Characteristics of the Studies

Of the 9 studies examined, there were an average of 51,796 participants, ranging from 2,339 to 133,479. All of the participants were female, each focusing on various age ranges, and using an assortment of study designs, as seen in **Table 1**.

Purposes of the Studies

- Each of the studies examined the association between breast cancer risk and alcohol consumption in adult females
- Some studies aimed to evaluate the dose-response relationship of this association, proposing that moderate to high consumption of alcohol was required to elicit a risk for breast cancer (4,5)
- 5 of the studies analyzed risk based on type of alcohol, 3 found no variation, and 2 found statistically insignificant differences when alcohol consumption consisted of combined types (alcohol, wine and liquor)

Study	Number of Participants (n)	Age of Participants	Type of Study	Measure of Risk	Results (95% CI)
Bowlin et al., 1997	2 428	20-79	Case-control	Odds ratio	1.40 (CI: 1.09-1.79)
Chen et al., 1997	74 854	33-55	Prospective observational	Relative risk	1.51 (CI: 1.35-1.70)
Garland et al., 1999	11 6671	24-42	Prospective cohort	Relative risk	1.23 (CI: 0.68-2.21)
Horn-Ross et al., 2004	133 479	25-85	Cohort	Relative risk	1.28 (CI: 1.06-1.54)
Li et al., 1999	87 724	50-79	Prospective observational	Hazard ratio	1.82 (CI: 1.18-2.81)
Rohan et al., 2000	7 150	40-59	Case-cohort	Incidence rates ratio	1.05 (CI: 1.00-1.09)
Terry et al., 2006	3 064	20-98	Case-control	Odds ratio	1.33 (CI: 1.01-1.74)
Zhang et al., 2007	38 454	45+	Prospective observational	Relative risk	1.32 (CI: 0.96-1.82)

Table 1. Summary of analyzed articles and results

Summary of the Results

In general, each of the findings found some form of correlation between alcohol consumption and risk for breast cancer development. Chen et al. (6) found that women who consumed at least 30g of alcohol per day had a greater risk for breast cancer (RR 1.51, 95% CI: 1.35-1.70), and Zhang et al. (7) found similar results (RR 1.32, 95% CI: 0.96-1.82). Garland et al. (8) established that the relative risk associated with consuming more than 20g/day of alcohol was 1.23 (95% CI: 0.68-2.21), compared to those who consumed less than 20g/day. Horn-Ross et al. (9) found similar results for current drinkers of more than 20 g/day vs. non-drinkers (RR 1.28, 95% CI: 1.06-1.54). Bowlin et al. (10) determined the odds ratio for ever vs. never drinking was 1.40 (95% CI: 1.09-1.79). Li et al. (11) used hazard ratios (HR) to conclude that compared to never drinkers, those who consumed more than 7 drinks/week, had an almost twofold increased risk for lobular carcinoma (HR=1.82, 95% CI: 1.18-2.81). Rohan et al. (5) found that when alcohol consumption was analyzed as a continuous variable, there was a 5% increased risk per 10 g-increase in total alcohol intake per day (incidence rates ratio IRR = 1.05, 95% CI: 1.00-1.09). Lastly, Terry et al. (4) found that consumption of 15-30g/day of alcohol throughout life was associated with a 33% increased risk for developing breast cancer (OR 1.33, 95% CI: 1.01-1.74).

Discussion

- The research indicates an association between moderate alcohol consumption and an increased risk of breast cancer
- The reviewed literature implicates a hormonal mechanism, in which circulating levels of steroid hormones increase correspondingly with increasing levels of alcohol within the body (6,11), which can lead to:
 - ❖ Altered enzymatic activity
 - ❖ Elevated synthesis of adrenal steroid hormones
 - ❖ Reduced hepatic androgenic catabolism
 - ❖ Increased transcription activity of the estrogen receptor 1 (ESR1) gene and subsequent proliferation of ER-α and upregulation of estrogen (6)
- A general consensus existed among the articles that moderate alcohol consumption constituted 20-30g/day or 1.5-2 alcoholic beverages
- Inconsistencies remain in regards to which characteristic or pattern of alcohol consumption is the strongest predictor of breast cancer risk
- The most commonly reported bias was misclassification bias due to the use of Food Frequency Questionnaires (FFQ)

- To overcome potential inconsistencies within the self-reported data, researchers often triangulated FFQ data with other self-reported measures such as detailed food diaries
- Among the case-control studies recall bias was a common concern, indicating that recollection of alcohol consumption may be more accurate among cases compared to controls

Limitations

- Small clinical heterogeneity in terms of the global population – this study was largely representative of the North American population, which inhibits generalizability outside of the subcontinent
- Foreign language exclusion bias – the review did not incorporate studies published in any language other than English
- Limited scope – this was due to the consultation of only one data base (Scholars Portal)

Strengths

- Avoided conformational bias – investigators did not limit findings to studies that fit preconceived notions regarding the topic
- Analyst triangulation – Each investigator synthesized the information presented in all 8 articles; a collaboration occurred to address the different perceptions and interpretations of the data
- Strengths inherent to the reviewed literature:
 - ❖ Large sample sizes
 - ❖ High statistical power
 - ❖ Minimal bias
 - ❖ Controlled confounders

Applications

- Findings from one study suggest that women aged 23-30 are more susceptible to alcohol-related breast cancer risk; the reason for this is unclear and warrants further investigation
- If these findings can be substantiated, prevention programs aimed at reducing alcohol consumption should mainly target this population
- More comprehensive data is required to better understand how certain patterns and characteristics of alcohol consumption influence breast cancer risk

Conclusion

Breast cancer is the second leading cause of death from cancer among Canadian women, rendering further investigation towards prevention, early detection, and treatment of the disease (1). From this literature review, there is definitive evidence that modifiable risk factors, like alcohol consumption, can affect a woman's likelihood of developing the disease. Each of the studies investigated demonstrated a dose-response relationship between alcohol consumption and breast cancer risk: the more alcohol consumed, the greater the risk of development.

This is an emerging topic with a need for further research regarding the patterns of alcohol consumption; for example how frequency of consumption, and drinking at various stages in life affects breast cancer development. To generate a greater understanding of the topic, future research should focus on the biological mechanisms and hormonal alterations associated with alcohol consumption.

Aknowledgments

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