Abstract

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 Journals. Due to a relatively large number of electronically identified articles the search was restricted to “alcohol consumption” AND “breast cancer” within the 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.

Methods

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

- **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

**Data Extraction**

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 alcohol consumption facilitates breast cancer development.
- 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).

Discussion

- The research indicates an association between moderate alcohol consumption and an increased risk of breast cancer.
- The proposed mechanism 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
  - Upregulated synthesis of estrogenic steroids
  - Reduced hepatic androgenic catabolism
  - Increased transcription activity of the estrogen receptor 1

- A general consensus existed among the articles that moderate alcohol consumption constituted 20-30g/day or 1.5-2.0 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).

In conclusion, the research indicates an association between moderate alcohol consumption and an increased risk of breast cancer. The proposed mechanism 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:

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- 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 exhibits generalizability outside of the continent.
- 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 9 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 certainly target this population.
- More comprehensive data analysis is necessary to better understand 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 (1,2). From this literature review, there is definitive evidence that modifiable risk factors, like alcohol consumption, can affect a woman’s likelihood of developing breast cancer. To generate a greater understanding of the topic, future research should focus on the biological mechanisms and hormonal alterations associated with alcohol consumption.

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