Progress in Nutrition 2018; Vol. 20, N. 3: 313-317 DOI: 10.23751/pn.v20i3.5685

Review

Alcohol consumption and risk of Barrett's Esophagus. Mini-review of recent literature

Daniele Nucci[1], Vincenza Gianfredi[2], Liliana Minelli[3], Stefano Realdon[1]

[1]Digestive Endoscopy Unit, Veneto Institute of Oncology IOV – IRCCS, Padua, Italy - E-mail: daniele.nucci@iov.veneto.it; [2]School of Specialization in Hygiene and Preventive Medicine, University of Perugia, Perugia, Italy; [3]Department of Experimental Medicine, University of Perugia, Perugia, Italy

Summary. Alcohol consumption has a substantial importance in the causation of cancer of the oral cavity, pharynx, liver, colon, rectum; and in women, breast. It is also recognized as an independent risk factor for esophageal squamous cell carcinoma (ESCC). Nevertheless, the association with esophagus adenocarcinoma (EAC) is still not completely defined; as well as the association between alcohol intake and Barrett's Esophagus (BE). The aim of this mini-review is to summarize recent findings from population studies focused on the association between alcohol consumption and risk of BE. The research was carried out in PubMed, filtering for studies conducted in the period 2009-2015. Our mini-review has shown no association between the consumption of alcohol and BE. Some type of alcoholic beverages has shown an inverse association. Direct public health applications of these findings are limited, considering the causal link between moderate-to-heavy alcohol consumption with increased risks of several cancers. Given the rising incidence of BE and EAC, it is important to understand the interplay of dietary and lifestyle factors that influence the development of these conditions.

Key words: Barrett's Esophagus/Oesophagus, alcohol, alcohol consumption, risk factor, wine, beer, liquor, spirits, ethanol, alcoholic beverages

Abbreviations

BE: Barrett's Esophagus; **EAC**: esophagus adenocarcinoma; **ESCC**: esophageal squamous cell carcinoma; **GERD**: Gastroesophageal reflux disease; **IARC**: International Agency for Research on Cancer; **OR**: Odds Ratio; **RR**: Relative Risk; **LES**: Low Esophageal Sphincter; **CI**: Confidence Interval; **HR**: Hazard Ratio

Introduction

Esophageal cancer is the 8th and 19th most common cancer worldwide and in Europe, respectively.

In 2012, the estimated incidence of esophageal cancer worldwide was 456,000 new cases (3% of all cancers), representing the sixth most common cause of death from cancer with an estimated 400,000 deaths (5 of total deaths) (1, 2). The disease is three to four times more common among men and it could account in two different histotypes: adenocarcinoma (EAC) and squamous cell carcinoma (ESCC). Cases of EAC have risen dramatically in the last decades: a fivefold incidence increase from the figures given in 1970s have been reported; and it has become the main esophageal malignancy in many Western countries (3-5). Barrett's esophagus (BE) is considered the premalignant precursor lesion and the strongest risk factor for EAC (6). The incidence of BE can be comparable with the increase of EAC as well (7-9).

The American Gastroenterological Association defines BE as a condition in which any extent of metaplastic columnar epithelium replaces the stratified squamous epithelium that normally lines the distal esophagus (10, 11). BE was initially categorized as long segment (currently define as >3 cm) and short segment (currently define as ≤3 cm) (12).

BE affect 1-2% of general population (13) and, currently, only about 5% of patients with esophageal adenocarcinoma have a pre-cancer diagnosis of Barrett's esophagus (8, 14).

The most recognized and strong risk factor for BE is gastroesophageal reflux disease (GERD). Other important risk factors for BE include: abdominal obesity, tobacco use, and male gender (15) while, alcohol consumption is one of the most debated risk factor in Barrett's Esophagus (BE) onset.

Identifying, understanding and intervening on potentially modifiable risk factors for BE onset could have a major impact on the rate of esophageal adenocarcinoma.

Based on a systematic review of the available evidence and robust scientific consensus, alcohol was classified by the International Agency for Research on Cancer (IARC) as group 1, "carcinogenic to humans". Especially, alcohol is shown to have a dose dependent risk association and is related to the duration of the habit. Alcohol consumption has a substantial importance in the causation of cancer of the oral cavity, pharynx, liver, colon, rectum; and in women, breast (16-18). In particular, it is also recognized as an independent risk factor for esophageal squamous cell carcinoma (ESCC) (17, 19-23). Nevertheless, the association with EAC is still not complete defined, as well as the association between alcohol intake and Barrett's esophagus.

The aim of this mini-review is to summarized recent findings from population studies focused on the association between alcohol consumption and risk of BE. The research was carried out in PubMed, filtering for studies conducted in the period 2009-2015, with keywords: Barrett's Esophagus/Oesophagus and Alcohol, alcohol consumption, risk factor, wine, beer, liquor, spirits, ethanol, alcoholic beverages; combined with the Boolean operator: OR/AND.

Total Alcohol consumption and risk of Barrett's Esophagus

Several studies (Table 1) evaluating the association between alcohol intake and risk of BE have shown that alcohol intake is not consistently associated with the risk of Barrett's esophagus (24-30).

Thrift et al. (25) have shown a significant inverse association between lifetime total alcohol consumption and the risk of nondysplastic or dysplastic BE. The duration of drinking median in subjects with nondysplastic BE was 35 years (Q1: 27; Q3: 43) in males and 29 years (Q1: 21; Q3: 39) in females; in dysplastic BE duration of drinking median was 41 years (Q1: 35; Q3: 48) in males and 34 years (Q1: 25;Q3: 45) in females. The inverse association between Barrett's esophagus and alcohol consumption was found in subjects with an alcohol intake which ranged between 7-20 drinks/week (intermediate consumption) (nondysplastic BE: OR = 0.53, 95 % CI: 0.31 –0.91; dysplastic BE: OR=0.52, 95 % CI: 019-1.43) and 21-41 drinks/week (high consumption) (nondysplastic BE: OR = 0.37, 95 % CI: 0.19 – 0.73; dysplastic BE: OR=0.22 95% CI= 0.007-0.73), compared with nondrinkers and consumption of less than 1 drink/week. Steevens et al. demonstrated that subjects with an intake ≥30g of ethanol per day had an RR of 0.82 when compared with abstainers (26). Furthermore in subjects aged 20 and 30 years old, alcohol consumption was not associated with an increased risk of BE (25, 27, 28).

Moderate drinking (7 - 13 drinks/week or 1 - <3 drinks/day) has a borderline or no statistically significant inverse association (24, 29, 30), whilst subjects who reported to typically consume between three and five alcoholic drinks per day (intermediate intake) had statistically significant lower risk of Barrett's esophagus compared with non-drinkers (29).

The association between alcohol and BE do not appear to be modified by other factors such as Body Mass Index (BMI), Waist-to-Hip Ratio (WHR), Gastroesophageal reflux disease (GERD), or the duration of GERD symptoms, smoking and gender (25, 29, 30).

Although there are trends for a lower risk among subjects with moderate intakes and a higher risk for those with heavier intakes, there is no conclusive evidence.

Type of alcohol and risk of Barrett' Esophagus

Beer

Most studies show that drinking beer is not associated with BE (24, 27, 29,). One case-control study conducted by Trifth et al. has shown a lower risk, which was not statistically significant, among subjects consuming 14 to 28 drinks/week of beer, compared to life-long non-drinkers (30). These results were also confirmed by another study founding a significant inverse linear trend between beer consumption and non-dysplastic BE (P = 0.04) (25). Inverse association between high beer consumption (>21 pints per week) and BE was also seen for consumption at age 21 years (27).

Liquor

No significant relationships between drinking liquor and BE was found (24, 27, 29). However, an Australian population-based case-control study and a recent meta-analysis has provided evidence of increased BE risk with increased liquor consumption (11, 25).

Wine

Wine consumption has been reported to be inversely associated with BE risk (26, 27). Thrift et al. have shown a statistically significant inverse association with any level (drinks/day) of wine consumption (any vs. non-drinkers, summary OR=0.71, 95% CI 0.52–0.98, I2=0%); these figures were also adjusted for total alcohol consumption (29). The authors also retrospectively evaluated wine consumption at the age of 21 years old, and no significant association with an increased risk of BE was found (27). Kubo et al., showed that subjects consuming a glass of wine a day on average (≥7 glasses of wine a week), had less than half the risk of Barrett's esophagus compared with non-alcohol drinkers (OR, 0.44; 95% CI, 0.20–0.99) (24). Finally, in the study of Yates et al., no association was seen between wine and BE, which suggests there may be any protective effect of wine that can prevent the malignant transformation of metaplastic epithelium (28).

Comparing non-drinkers to drinkers, no associations were seen for wine consumption (HR 0.90, 95 % CI 0.48–1.69), beer (HR 1.55, 95 % CI 0.73–3.29) or spirits (HR 0.68, 95 % CI 0.38–1.22) (28).

Discussion and Conclusion

Findings from this mini-review suggest that total alcohol consumption is not a risk factor for BE. In actual fact, when comparing population controls and BE patients, there is no statistical significant association between alcohol consumption and BE, nor studies have shown an inverse association between the two (11, 24-30). When analyzing in-depth the beverage type assumption, liquor was associated with an increased risk of BE (11, 24-26) whereas, wine and beer do not appear to increase the risk for BE (11, 24-30).

These differences between the various alcohol types could be due to diverse drinking patterns. Wine drinkers usually consume their alcoholic beverage with meals, whereas liquor drinkers are less inclined to do so (31). Consuming alcohol with food can reduce potential damage to esophageal epithelium and, consequently, the risk of carcinogenic process (31). Liquor with its high alcohol concentration may cause a direct esophageal tissue irritation, which may already have been injured by frequent reflux. (24)

Several studies had provided a number of plausible mechanisms to explain these findings. For example, the amount of antioxidants provided by wine intake (32, 33), and to a lesser extent in beer (34), may confer benefits (35). Moreover, the protective effects of chronic low ethanol consumption may improve insulin resistance and decrease advanced glycation end-products (AGEs) (33). Another possibility is that the seemingly protective effects of lifetime alcohol consumption may simply be an aversion effect, as BE patients may refrain from alcohol consumption over time after enduring prolonged reflux discomfort. Despite this, in a large population-based case-control study, Thrift et al. observed similar reduced risks in BE patients compared with inflammation controls (patients with GERD) (25). These results seems to suggest that alcohol avoidance by BE patients are unlikely to explain in full the observed effects.

In conclusion, our mini-review has shown that alcohol consumption seems to be not associated with BE. The review has shown also an inverse association for some types of alcoholic beverages and BE onset. Nevertheless, these findings have to be interpreted with caution due to multiple sources of possible bias.

It is possible that reported results may be affected by recall bias and selection bias. The main and common recall bias is referred to misclassification of overreporting or underreporting of alcohol intake by the individuals. A possible selection bias is represented by the fact that BE is usually diagnosed in patients with GERD, but we cannot exclude BE in asymptomatic individuals, who are usually undiagnosed and this may have influenced our results.

Moreover, alcohol has shown to reduce LES pressure and promote GERD symptoms. Hence, the protective effect demonstrated by various forms of alcoholic beverages may be due to an aversion effect.

Nevertheless, the direct public health applications of these findings are limited, considering the causal link between moderate-to-heavy alcohol consumption with increased risks of several cancers (16). On the other hand, given the rising incidence of BE and EAC, it is important to understand the interplay of dietary and lifestyle factors that influence the development of these conditions.

Acknowledgements

We gratefully acknowledge Mrs Daniela Toale for language revision of this manuscript.

References

1.Ferlay J, Steliarova-Foucher E, Lortet-Tieulent J, Rosso S, Coebergh JW, Comber H, et al. Cancer incidence and mortality patterns in Europe: estimates for 40 countries in 2012. Eur J Cancer 2013;49:1374-403.
2.McGuire S. World Cancer Report 2014. Geneva, Switzerland: World Health Organization, International Agency for Research on Cancer, WHO Press, 2015. Adv Nutr 2016;7:418-9.
3.Realdon S, Antonello A, Arcidiacono D, Dassie E, Cavallin F, Fassan M, et al. Adherence to WCRF/AICR lifestyle recommendations for cancer prevention and the risk of Barrett's esophagus onset and evolution to esophageal adenocarcinoma: results from a pilot study in a high-risk population. Eur J Nutr 2016;55:1563-71.
4.Lepage C, Rachet B, Jooste V, Faivre J, Coleman MP. Continuing rapid increase in esophageal adenocarcinoma in England and Wales. Am J Gastroenterol 2008;103:2694-9.
5.Brown LM, Devesa SS, Chow WH. Incidence of adenocarcinoma of the esophagus among white Americans by sex, stage, and age. J Natl Cancer Inst 2008;100:1184-7.
6.Jung KW, Talley NJ, Romero Y, Katzka DA, Schleck CD, Zinsmeister AR, et al. Epidemiology and natural history of intestinal metaplasia of the gastroesophageal junction and Barrett's esophagus: a population-based study. Am J Gastroenterol 2011;106:1447-55; quiz 56.
7.Sharma P, McQuaid K, Dent J, Fennerty MB, Sampliner R, Spechler S, et al. A critical review of the diagnosis and management of Barrett's esophagus: the AGA Chicago Workshop. Gastroenterology 2004;127:310-30.
8.Schneider JL, Corley DA. A review of the epidemiology of Barrett's oesophagus and oesophageal adenocarcinoma. Best Pract Res Clin Gastroenterol 2015;29:29-39.
9.van Soest EM, Dieleman JP, Siersema PD, Sturkenboom MC, Kuipers EJ. Increasing incidence of Barrett's oesophagus in the general population. Gut 2005;54:1062-6.
10.American Gastroenterological A, Spechler SJ, Sharma P, Souza RF, Inadomi JM, Shaheen NJ. American Gastroenterological Association medical position statement on the management of Barrett's esophagus. Gastroenterology 2011;140:1084-91.
11.Xu Q, Guo W, Shi X, Zhang W, Zhang T, Wu C, et al. Association Between Alcohol Consumption and the Risk of Barrett's Esophagus: A Meta-Analysis of Observational Studies. Medicine (Baltimore) 2015;94:e1244.
12.Rajendra S, Sharma P. Barrett's Esophagus. Curr Treat Options Gastroenterol 2014;12:169-82.
13.Dubecz A, Gall I, Solymosi N, Schweigert M, Peters JH, Feith M, et al. Temporal trends in long-term survival and cure rates in esophageal cancer: a SEER database analysis. J Thorac Oncol 2012;7:443-7.
14.Corley DA, Levin TR, Habel LA, Weiss NS, Buffler PA. Surveillance and survival in Barrett's adenocarcinomas: a population-based study. Gastroenterology 2002;122:633-40.
15.Rubenstein JH. Risk factors for Barrett's esophagus. Curr Opin Gastroenterol 2014;30:408-14.
16.Boffetta P, Hashibe M. Alcohol and cancer. Lancet Oncol 2006;7:149-56.
17.Corrao G, Bagnardi V, Zambon A, La Vecchia C. A meta-analysis of alcohol consumption and the risk of 15 diseases. Prev Med 2004;38:613-9.
18.Humans IWGotEoCRt. Alcohol consumption and ethyl carbamate. IARC Monogr Eval Carcinog Risks Hum 2010;96:3-1383.
19.Kabat GC, Ng SK, Wynder EL. Tobacco, alcohol intake, and diet in relation to adenocarcinoma of the esophagus and gastric cardia. Cancer Causes Control 1993;4:123-32.
20.Pandeya N, Williams G, Green AC, Webb PM, Whiteman DC, Australian Cancer S. Alcohol consumption and the risks of adenocarcinoma and squamous cell carcinoma of the esophagus. Gastroenterology 2009;136:1215-24, e1-2.
21.Pelucchi C, Gallus S, Garavello W, Bosetti C, La Vecchia C. Alcohol and tobacco use, and cancer risk for upper aerodigestive tract and liver. Eur J Cancer Prev 2008;17:340-4.
22.Steevens J, Schouten LJ, Goldbohm RA, van den Brandt

PA. Alcohol consumption, cigarette smoking and risk of subtypes of oesophageal and gastric cancer: a prospective cohort study. Gut 2010;59:39-48.
23. Vioque J, Barber X, Bolumar F, Porta M, Santibanez M, de la Hera MG, et al. Esophageal cancer risk by type of alcohol drinking and smoking: a case-control study in Spain. BMC Cancer 2008;8:221.
24. Kubo A, Levin TR, Block G, Rumore GJ, Quesenberry CP, Jr., Buffler P, et al. Alcohol types and sociodemographic characteristics as risk factors for Barrett's esophagus. Gastroenterology 2009;136:806-15.
25. Thrift AP, Pandeya N, Smith KJ, Mallitt KA, Green AC, Webb PM, et al. Lifetime alcohol consumption and risk of Barrett's Esophagus. Am J Gastroenterol 2011;106:1220-30.
26. Steevens J, Schouten LJ, Driessen AL, Huysentruyt CJ, Keulemans YC, Goldbohm RA, et al. A prospective cohort study on overweight, smoking, alcohol consumption, and risk of Barrett's esophagus. Cancer Epidemiol Biomarkers Prev 2011;20:345-58.
27. Anderson LA, Cantwell MM, Watson RG, Johnston BT, Murphy SJ, Ferguson HR, et al. The association between alcohol and reflux esophagitis, Barrett's esophagus, and esophageal adenocarcinoma. Gastroenterology 2009;136:799-805.
28. Yates M, Cheong E, Luben R, Igali L, Fitzgerald R, Khaw KT, et al. Body mass index, smoking, and alcohol and risks of Barrett's esophagus and esophageal adenocarcinoma: a UK prospective cohort study. Dig Dis Sci 2014;59:1552-9.
29. Thrift AP, Cook MB, Vaughan TL, Anderson LA, Murray LJ, Whiteman DC, et al. Alcohol and the risk of Barrett's esophagus: a pooled analysis from the International BEACON Consortium. Am J Gastroenterol 2014;109:1586-94.
30. Thrift AP, Kramer JR, Richardson PA, El-Serag HB. No significant effects of smoking or alcohol consumption on risk of Barrett's esophagus. Dig Dis Sci 2014;59:108-16.
31. Vaughan TL, Davis S, Kristal A, Thomas DB. Obesity, alcohol, and tobacco as risk factors for cancers of the esophagus and gastric cardia: adenocarcinoma versus squamous cell carcinoma. Cancer Epidemiol Biomarkers Prev 1995;4:85-92.
32. Bianchini F, Vainio H. Wine and resveratrol: mechanisms of cancer prevention? Eur J Cancer Prev 2003;12:417-25.
33. Vasdev S, Gill V, Singal PK. Beneficial effect of low ethanol intake on the cardiovascular system: possible biochemical mechanisms. Vasc Health Risk Manag 2006;2:263-76.
34. Gerhauser C. Beer constituents as potential cancer chemopreventive agents. Eur J Cancer 2005;41:1941-54.
35. Kubo A, Levin TR, Block G, Rumore GJ, Quesenberry CP, Jr., Buffler P, et al. Dietary antioxidants, fruits, and vegetables and the risk of Barrett's esophagus. Am J Gastroenterol 2008;103:1614-23.

Correspondence:
Daniele Nucci
Digestive Endoscopy Unit
Veneto Institute of Oncology IOV – IRCCS, Italy
Via Gattamelata, 64 – 35128 Padua, Italy
Tel. 0498211719
E-mail: daniele.nucci@iov.veneto.it