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Alcohol consumption and breast cancer risk

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Abstract

Background: Breast cancer (BC) is the most common disease among women worldwide. The risk factors related to this disease have been widely discussed in the literature, however, the possible effect of alcohol consumption remains unclear and requires further clarification and in-depth understanding. Our review examines alcohol consumption as a risk factor for breast cancer. From 1989 to 2018, many prospective studies have been carried out to control the emergence of this cancer, many of them aimed at clarifying the association between alcohol consumption and the risk of developing BC in women. **Methods:** Studies included in this review were selected from PubMed, Search gate, Google Scholar, and EBESCO databases. Twenty-three articles were included and selected for further evaluation **Results:** Twenty-three articles were included and selected for further assessment. **Results:** Alcohol consumption is positively associated with breast cancer risk compared to non-drinkers. Studies reviewed have shown that the association may be influenced by several factors, including age, premenopausal and postmenopausal status, measurement error, misclassification, or affected by other factors such as social factors, drinking habits, duration and intensity of alcohol consumption, or BC family history. **Conclusion:** There is a positive effect of alcohol consumption on BC risk among women at all levels of consumption.

Keywords: Breast cancer, risk factors, alcohol consumption.

Introduction

Breast cancer is considered one of the most prevalent cancers in women worldwide, leading to significant mortality (Qian et al., 2014). In the United States in 2015, BC incidence was estimated at 230,000 new cases and over 40,000 deaths. Data, classified this type of cancer as a great public health problem (McClain et al., 2017). The International Agency for research of Cancer has shown that Alcohol consumption is one of BC factors, with a 7-10% increased risk for each 10g (about 1 drink) of daily consumption of alcohol by adult women (Liu et al., 2015). Epidemiologic studies have shown that alcohol consumption exhibited a positive association with increased BC risk, and it is considered now as an established risk factor for this disease (Minami et al., 2019). Most studies linking alcohol consumption and BC have examined alcohol intake in terms of constant or non-constant consumption or average daily dose. The duration and age at onset of alcohol use in association with CB risk are not well understood (Qian et al., 2014). Alcohol consumption is a stable risk factor for BC that could be modified depending on the amount consumed (Kim et al., 2017).

In addition, alcohol consumption in women also increases this risk depending on how long a woman has consumed alcohol in her lifetime (Holmberg et al., 1995). It is very important to clarify how alcohol consumption can increase BC risk and lead to a bad social and moral situation for women. Knowing more about this issue leads to stronger health strategies and more informed decision-making related to BC prevention and treatment.

In this current review we aim to identify and evaluate the impact of alcohol consumption on BC risk, based on many previous studies examining the lifestyle of women who drink alcohol. Furthermore, in order to clarify how this intensity of alcohol (alcohol) consumption is considered to be the main factor in increasing the risk of breast cancer in young and adult women and to explain how age can differentiate the impact of alcohol

Methods

Search strategy: Studies included in this mini-review were selected from PubMed, Search gate, Google Scholar, and EBESCO databases. The keywords or phrases used in the search were [breast cancer], [alcohol consumption and breast cancer], [alcohol consumption], [alcohol as a factor in breast cancer] and [breast cancer factors].

The initial research based on 60 articles, 2 articles were removed, 15 articles were screened based on the titles and abstracts, 20 other articles were excluded due to non-eligibility. Then, 23 articles were included and selected for further evaluation. All included studies met the following criteria (Figure 1):

Inclusion criteria:

- Articles written in the English language;
- Studies that treat lifetime alcohol consumption and BC risk;
- Cohort and prospective cohort studies;
- Published from 1989 to 2018.

Exclusion criteria:

- Studies examined the treatment of BC.
- Epidemiological studies of BC risk.

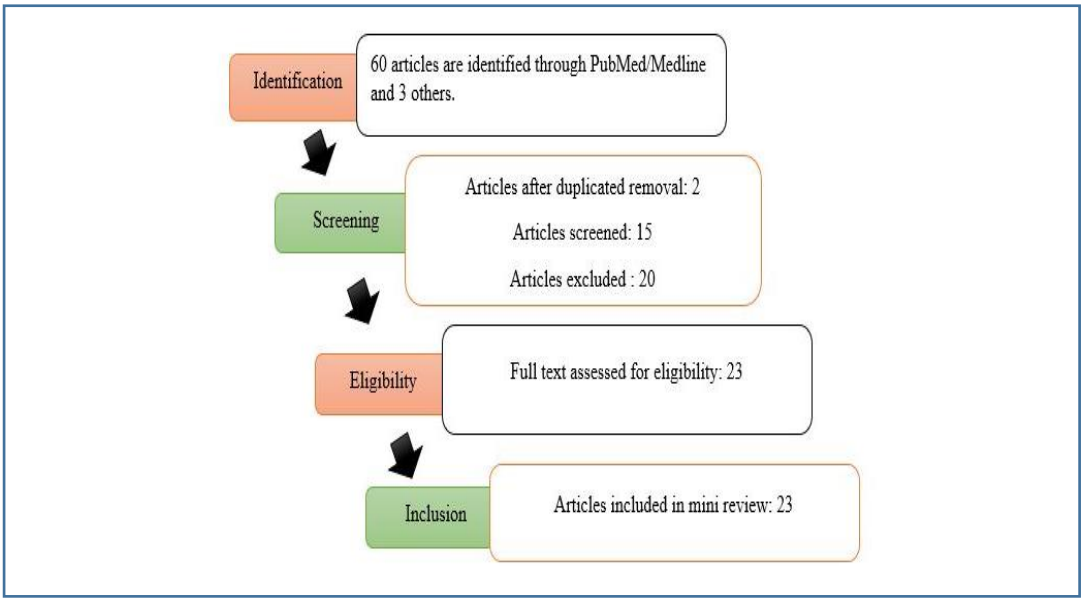


Figure 1: Flow diagram of selected records.

Results:

The outcomes highlight the association between alcohol consumption and the estimated risk of BC. Table 1 presents 21 studies assessing drinking habits and estimating BC risk (Table 1).

- *Drinking patterns and BC risk*

In overall 5531 cases showed a positive asscociation between alcohol drinking and the risk of BC (Qian et al., 2014; Terry et al., 2006; Trinh et al., 2015). Alcohol use increases BC even at a moderate level of intake; 147 cases that consume 15-30g per day about 1 to 2 drinks had a risk estimate on OR= 33%, 1.35(95% 0.96-1.91) (Terry et al., 2006). Even at a low level of consumption, alcohol has an effect of increasing BC risk; 0.1-4.9 g/d it is estimated with OR 1.82 (95%1.31-2.54) (Qian et al., 2014). Additionally, a study suggesting that the positive association between alcohol consumption and mammographic density may increase breast cancer risk; 2792 cases who drink alcohol from 5.0 to 9.9 g per day increase the mammographic density by 2.6 cm3 and the risk of BC is (95% 0.2–4.9) (Trinh et al., 2015). There is also an association between the intensity of alcohol consumption and the BC risk estimate (Berstad et al., 2008; Lin et al., 2005; Rohan et al., 2000a). Consumption of more than 15 g per day or more (11cases) has an estimated risk of BC with OR=2.93;95%CI 1.55-5.54 indicating a positive association between Alcohol drinking and BC risk, but in women who consumed less than 15 g per day, there was no association (for example;5.0–14.9g per day with a risk estimate of OR=0.83;95CI 0.34–2.04). In addition, drinkers have the biggest chance to develop BC (OR=1.27;95% 0.87–1.84) than non-drinkers (Lin et al., 2005). Women who drank more than 50g per day (57cases) have an estimated risk of BC of OR=1.70;95CI 0.97-2.98, this means a

70% increased risk compared to those who consumed less than 50 g per day. (Rohan et al., 2000a). The study by Berstad et al., showed that drinking of 14 or more drinks per week (113 cases) of each type of alcohol (Beer, Wine, or liquor) was associated with BC risk with 82% in comparison with women who consumed less than 14 drinks per week in the early period of life (Berstad et al., 2008). Another case-control study conducted in Long Island, New York, from 1984 to 1986 found that the gram per day and duration of alcohol consumption are associated with increased BC risk. This is evidence that suggests that the intensity of alcohol consumption matters most (Bowlin, 1997). Otherwise, 3 studies showed that there was no association between alcohol consumption and BC risk. (Kawai et al., 2011; Kim et al., 2017; Schatzkin et al., 1989). Two thousand and sixty cases were not affected by the positive impact of alcohol consumption on BC risk. Regarding alcohol consumption ≥ 10 grams per day, the estimated risk was OR = 1.07. Kawai et al., also, showed that no significant association was observed between alcohol consumption and the risk of BC in women (7 cases) who drank more than 15 g/day OR= 0.87; CI95% 0.40–1.91, and *p* for trend was 0.85 (Kawai et al., 2011). Additionally, Schatzkin et al., found that there was no association between alcohol consumption and breast cancer risk among women (35 cases) who consumed more than 5 or more g/day, the risk estimate was OR= 0.8; CI 0.5-1.2 and *p* for trend was 0.41 (Schatzkin et al., 1989).

- *Age and BC risk*

Eleven studies found that the effect of alcohol consumption on breast cancer risk is different between adult and older women or between premenopausal and postmenopausal women. (Berstad et al., 2008 ; Chen et al., 2011; Ewertz, 1991; Ferraroni et al., 1991; Garland et al., 1999; Holmberg et al., 1995; Horn-Ross et al., 2004; Longnecker et al., 1995; McClain et al., 2017; Schatzkin et al., 1989; Vieira et al., 2018). The association of alcohol consumption risk was independent in younger and adult women; the level of 5–9.9 g per day in 748 cases in women aged 18–40 years, the estimated risk of BC was OR=1.05 (95% CI 0.93–1.18) but among 704 cases, women aged ≥ 40 years old the estimated risk was OR=1.07;95%CI 0.96-1.19 (Chen et al., 2011). In addition, the study conducted by Vieira et al., reported a significant association between British Columbia and the risk factor for alcohol use among women; Women younger than 50 had a risk of increased BC of OR = 4.7; 95% CI 1.4–16.2, nd women over 50 had a risk of OR=3.9; 95% CI 1.2–13.4 (Vieira et al., 2018). Moreover, one study showed that alcohol consumption had no effect on breast cancer risk in women under 50, but in those over 50 it had the effect increase the risk of BC: for 54 cases with an intake of 2 g per day or more, there was a risk of OR1.8; 95% CI 1.1-2.9 (Holmberg et al., 1995). Besides, Horn-Ross et al., showed in their study that the risk estimates of BC for both premenopausal and postmenopausal women was approximately the same in comparison with age; for age 18-22 years old alcohol consumption was not associated with BC but for women aged 30-35 years old the risk of BC was increased. Postmenopausal women who consume 20 gram per day or more (Age:30-35) have an estimated risk of BC of OR=1.20; CI 95% 0.93-1.55 but premenopausal women who drank 20 g/ day or more (Age:30-35) have a risk of OR=0.91; CI95% 0.53-1.57 meaning that postmenopausal women are at risk of increased BC risk more than premenopausal women (Horn-Ross et al., 2004).

Table 1: Alcohol consumption and estimation of breast cancer risk.

References	Years of follow up	No of cases N (%)	Drinking Age	Alcohol consumption g/d or drinks/week* N (%)	OR Risk estimate (95%IC)	*p* value
(Bowlin 1997),Long Island,New York	1984-1986	1214	20-79	0:154 0-5:549 ≥5 :510	1.00 1.36 (1.07-1.73) 1.52 (1.19-1.93)	0.002
(Lin et al. 2005),Japan	1997	151	<25 25-35 >35	0 : 103 Current drinkers :45 0.1–4.9 :13 5.0–14.9 :05 ≥15.0 :11	1.00 1.27 (0.87–1.84) 1.07 (0.57–2.00) 0.83 (0.34–2.04) 2.93 (1.55–5.54)	0.01
(Thomas E. Rohan et al. 2000)	1980-1993	1336	40-59	0 :304 0-10 :632 10-20 :215 20-30 :83 30-40 :51 40-50 :24 >50 :57	 1.01 (0.84-1.22) 1.16 (0.91-1.47) 1.27 (0.91-1.78) 0.77 (0.51-1.16) 1.00 (0.57-1.75) 1.70 (0.97-2.98)	0.35
(Berstad et al. 2008)	1998-2003	2882	15	0* :561 <3* :740 3-<7* :248 ≥7* :177	1.00 1.09 (0.84–1.41) 0.97 (0.68–1.39) 1.26 (0.81–1.96)	0.50
			15-20	0* :561 <3* :407 3-<7*:100 ≥7* :61	1.00 0.99 (0.73–1.34) 0.78 (0.48–1.25) 0.95 (0.50–1.82)	0.36
			-	Recent intake* 0* :561 <3* :482 3-<7*:217 7 – <14* :126 ≥14* :113	 1.00 1.06 (0.80–1.42) 1.05 (0.73–1.53) 1.36 (0.82–2.24) 1.82 (1.01–3.28)	0.04
(Schatzkin et al. 1989)	26 years	143	31-64	0 :63 0.1-1.4 :12 1.5-4.9 :31 ≥5 :35	1.00 0.7 (0.4-1.4) 1.1 (0.7-1.8) 0.8 (0.5-1.2)	0.41

(Garland et al. 1999), United States	1989-1995	445	23–30	0 :91 <1 : 96 1 :48 2–4 : 81 5–6 :48 >6 : 39	 1.13 (0.80–1.59) 1.17 (0.76–1.81) 1.25 (0.82–1.90) 1.65 (1.02–2.69) 1.72 (1.01–2.91)	0.05
(Zhang et al. 2007), United States	1992-2004	1484	≥45	0 :516 0.1-4.9 : 549 5.0-9.9 : 181 10.0-14.9 :109 15.0-29.9 : 88 ≥30.0 :41	1.00 1.02 (0.90, 1.15) 1.13 (0.95, 1.34) 1.14 (0.92, 1.40) 1.16 (0.92, 1.45) 1.32 (0.96, 1.82)	0.02
(Kawai et al. 2011),Japan	1990-2003	241	40-64	0 :171 <5 :40 5-15 :15 ≥15 :7	1.00 1.02 (0.72–1.46) 1.21 (0.71–2.08) 0.87 (0.40–1.91)	0.85
(Ferraroni et al. 1991),North en Italy	1982-1985	214	30-65	0 :40 0.11-5.31 :33 5.32-13.10 :44 13.11-24.34 :36 24.35 + :57	1.00 1.1 (0.5-2.2) 1.5 (0.8-2.8) 1.2 (0.6-2.4) 2.1 (1.1-3.9)	0.014
(Horn-Ross et al. 2004), California	1995-1996	1742	Premenopausal women 30-35/18-22	0: 66/112 <5 :47/54 5-9 :67/59 10-14 :43/39 15-19 :21/9 ≥20 :17/12	1/1 0.98/0.97 (0.67-1.43/0.70-1.34) 1.27/1.12 (0.90-1.79/0.81-1.5) 1.23/1.10(0.84-1.82/0.76-1.60) 1.15/0.72(0.70-1.89/0.37-1.43) 0.91/0.62(0.53-1.57/0.34-1.13)	
			Postmenopausal women 30-35/18-22	0 :249/497 <5 :196/171 5-9 :177/104 10-14 :130/82 15-19 :75/25 ≥20 :79/27	1.00/1.00 1.22/ 1.03(1.01-1.47/0.86-1.23) 1.04/0.85(0.84-1.26/0.68-1.05) 1.28/1.17(1.03-1.59/0.92-1.48) 1.17/ 1.01(0.90-1.51/0.68-1.52) 1.20/ 1.07(0.93-1.55/0.72-1.58)	
(Ewertz 1991), Danmark	1983-1984	1486	<50 N=544	0 :10 1-23 :82 ≥ 24 : 8	1.00 0.74 (0.47-1.15) 0.63 (0.34-1.17)	0.15
			≥60 N=383	0 :24 1-23 :69 ≥ 24 :7	1.00 0.73 (0.50-1.06) 0.95 (0.44-2.07)	0.6

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(Trinh et al. 2015), Sweden	2014	53060	40-74	0 :1248 (16.8) 5.0–9.9 :2792 (37.5) 10.0–19.9 :510 (6.9) 20.0–29.9 :939 (12.6) 30.0–40.0 :197 (2.6)	1.00 2.6§ (0.2–4.9) 2.9§ (0.6-6.3) 4.6§ (1.5–7.7) 10.8§ (4.8–17.0)	<0,001
(Kim et al. 2017),US	1991-2011	2866	27-44	0 :806 0.1-4.9 :1334 5.0-9.9 :377 ≥ 10 : 349	1.00 1.0 (0.92,1.10) 0.98 (0.87,1.12) 1.07 (0.94,1.22)	0,39
(Longnecker et al. 1995)	1998-1991	6662	16-74	0 :698 >0-5 :4080 6-11 :900 12-18 :351 19-32 :248 33-45 :63 >4 :59	1.00 1.13(1.01-1.26) 1.24(1.08-1.42) 1.39(1.16-1.67) 1.69(1.36-2.10) 1.30(1.51-3.51) 1.75(1.16-2.64)	<0.001
(Terry MB et al 2006)	1996-1997	1508	<60 60+	0 :598 <15 :691 15-30 :147 ≥ 30 :72	1.00 1.12 (0.88-1.42) 1.35 (0.96-1.91) 0.81(0.55-1.19)	0,5
(Chen et al. 2011)	1980-2008	7690	18-40 N= 4956	0 : 816 0,1-4,9 :3028 5-9,9 :748 10-19,9 :322 ≥20 :42	1.00 1.02 (0.93-1.12) 1.05 (0.93-1.18) 1.15 (0.99-1.33) 1.21 (0.88-1.67)	<0,05
			≥40 N= 4956	0 :976 0,1-4,9 :2162 5-9,9 :704 10-19,9 :690 ≥20 :424	1.00 1.02 (0.93-1.10) 1.07 (0.96-1.19) 1.17 (1.04-1.31) 1.18 (1.03-1.34)	<0,001
(McClain et al. 2017), Long Island	1996-1997	990	<65 N= 488	0 :198 < 15 :217 15-30 :49 ≥ 30 :24	1.00 0.87 (0.66–1.14) 1.31 (0.82–2.10) 0.89 (0.50–1.59)	0.81
			65+ N= 518	0 :231 < 15 :223 15-30 :43 ≥30 : 21	1.00 1.10 (0.83, 1.46) 1.79 (1.03, 3.12) 0.96 (0.50, 1.85)	0.81

(Gapstur et al. 1992)	1986-1989	493	≤44 ≥55	0 :267 <1.5 :49 1.5-4 .9 :78 5.0-14.9 :56 ≥15.0 :43	 1.08 (0.80-1.47) 1.10 (0.86-1.42) 1.08 (0.81-1.44) 1.28 (0.93-1.76)	0,11
(Qian et al. 2014), Nigeria, Cameroon and Uganda	1998-2013	2138	≤18 ≥30	0 : 1730 (80.9) 0,1-4,9 5.0–9 : 101 (5.0) ≥10 : 82 (4.1)	1.00 1.82 (1.31–2.54) 1.52 (1.10–2.11) 1.50 (1.04–2.18)	0,92
(Vieira et al. 2018), Brazil	2000-2008	406	≤50 ≥50	Intake for 10 years or more	4.7 (1.4-16,2) 3.9 (1.2-13.4)	0.013 0.028
(Holmberg et al. 1995), Sweden	1987-1990	276	Premenopausal women <50 N=54	0 :15 ≤ 0,75 : 6 0,76-2 :15 ≥2 :18	1.00 0.4 (0.1-1.5) 0.7 (0.3-1.8) 0.8 (1.4-1.4)	-

OR: Odds Ratio, IC: Interval of Confidence, §: (Mammographic density cm^3)

- *Alcoholic beverage and BC risk*

The association between BC incidence and each type of alcoholic beverage consumed was also compared.

Six studies have examined the association, they found a positive association between alcohol type and BC risk. (Ewertz, 1991; Ferraroni et al., 1991; Gapstur et al., 1992; Qian et al., 2014; Rohan et al., 2000a; Zhang et al., 2007). Increased risk of BC was associated firstly with Beer; the level of consumption of less than 4 or 4 or more versus 0 g of Beer per day had a risk of 1.01;95% 0.74-1.39 and 1.54 (95%CI 1.10-2.17), respectively (p for trend = 0.017), the relative risk associated with less than 4 versus 0 g of wine was 1.21;95% CI 0.96-1.52. Consumption of liquor had no association (Gapstur et al., 1992). Estimates of the risk of alcohol use relative to BC risk in relation to the type of alcohol among women in three sub-Saharan African countries were overall: Beer, OR= 1.53;95%CI 1.22–1.91), Wine, OR= 1.32; 95%CI 0.91–1.92 and Spirits OR= 1.52 95%CI 0.99 –2.32(Qian et al., 2014).

In contrast, 3 studies revealed that there was no linear association between any type of alcohol and risk of BC. (Berstad et al., 2008; Garland et al., 1999; Schatzkin et al., 1989). The study conducted by Garland et al., by examining the consumption of certain specific beverages (wine, beer and liquor), showed no association with the risk of BC. (Garland et al., 1999). Another

study conducted by Schatzkin et al., highlighted no significant association between any types of beverages and BC; they found that the relative risk estimates for drinking cocktails, beer, and wine were; OR= 0.8 (95% CI,0.7-1.2), OR=1.3 (95% CI,0.8-2.1), and OR= 0.9 (95% CI, 0.6-1.3), respectively (Schatzkin et al., 1989). In addition, Berstad et al., showed that risk of BC did not vary by types of alcohol; the relative risk estimates of drinking 7 drinks/week of Beer, Wine, and Liquor were OR=2.28;95% CI 0.89–5.87, 1.12 (0.67–1.88) and OR= 3.20 (95% CI,0.95–10.75) respectively. (Berstad et al., 2008).

Discussion:

We examined the association between alcohol consumption and BC risk, based on several studies. During the investigation, 17 of them found a positive association, but the results differed according to the age of the women, the intensity of alcohol consumption and the magnitude of the risk. (Berstad et al., 2008; Chen et al., 2011; Ewertz, 1991; Ferraroni et al., 1991; Gapstur et al., 1992; Garland et al., 1999; Holmberg et al., 1995; Horn-Ross et al., 2004; Lin et al., 2005; Longnecker et al., 1995; McClain et al., 2017; Qian et al., 2014; Rohan et al., 2000a; Terry et al., 2006; Trinh et al., 2015; Vieira et al., 2018; Zhang et al., 2007) . In contrast 3 studies showed no association between the BC and alcohol drinking(Kawai et al., 2011; Kim et al., 2017; Schatzkin et al., 1989).

Overall, 4727 case-control studies conducted in three Sub-Saharan African Countries, from Nigeria, Cameroon, and Uganda showed a positive association between BC risk and alcohol drinking. Alcohol consumption among women in Nigeria and Cameron had a slightly increased risk compared to non-drinkers. However, in Uganda there was only a marginal increase in risk. A small sample (n = 380) may explain these non-significant results in Uganda. Also, overall, the odds of having BC among regular drinkers was 62% compared to nondrinkers. Among African women, alcohol consumption was less common than among women in developed countries, but they had changed their lifestyles and had become more exposed to alcohol. They also explain that the study did not examine alcohol consumption at each stage of the women's lives. Therefore, alcohol consumption was assumed to be constant throughout a subject's lifetime (Qian et al., 2014) . Terry MB et al., found that the odds ratio was 33%, 1.35(IC 95% 0.96-1.91, they showed that this result may be related to measurement error and also announced that drinking alcohol is less socially desirable. (Terry et al., 2006). Furthermore, the study carried out by Lin et al., showed that the consumption of 15 g/day or more of alcohol presents a risk of having a BC of 2.93 (95% CI 1.55-5.54), which explains the difference in results between consumption similar alcohol; first, alcohol metabolism influenced by genetic factors and its effect on breast cancer risk. Second, the difference between certain factors such as body mass index, age at first birth and early growth factors (Lin et al., 2005). Berstad et al., found that alcohol consumption in women under 50 who drink two or more drinks a day may be associated with an increased risk of breast cancer and reported that alcohol consumption early and during life was not associated with this risk. Then,, for the type of alcohol; they announced that drinking 14 or more glasses of beer, wine or alcohol per week had a risk of increasing BC by 82%, which means they had the same risk, that's why they confirmed that there was no relationship between alcoholic beverage consumption and BC risk (Berstad et al., 2008). The study conducted by Rohan et al., showed that the consumption of 50 g/day or more of alcohol

presents a risk of increasing the risk of BC by 70% compared to women who consumed less than 50 g/day. Briefly, the risk of breast cancer depends on high levels of alcohol consumption (Rohan et al., 2000a). Vieira et al., showed as results that the risk of having BC in relation to alcohol consumption in women under 50 was statistically significant OR= 4.7 (95% CI 1.4-16, 2), but there were four limitations in this study; First, they reported that there was little information on alcohol consumption: regular drinkers and non-drinkers. Second, they stated that recall bias is likely in all case-control studies because reference to information came from case-control self-reports. Third, the limitation of the results is that they only concerned the largest cities and the developed region of Brazil and not the whole country. Fourth, they analyzed information only about women attending one public hospital (Vieira et al., 2018).

McClain et al., showed that BC among women 65 years old or older was stronger with a risk of OR=0.96 (95% 0.50, 1.85) than women with age under 65 years old OR= 0.89 (95% 0.50–1.59), obtained results were encouraging; because the risk of BC in women 65 or older is modifiable, and they found that a study population in the same Long Island LIBCSP breast cancer study project they worked with, announced that reproductive history and use of exogenous hormones as other risk factors were more obvious for postmenopausal women 65 or older. Indeed, they revealed that working with alcohol consumption as a factor in BC for this age of women might be more obvious to reduce this incidence in postmenopausal women (McClain et al., 2017). Holmberg et al., showed that this association among women older than 50 years old is more observed than women under 50 years old. Drinking 2g/day or more had a risk estimate of OR=0.8 (IC95%1.4-1.4) and OR= 1.8 (IC 95% 1.1-2.9) respectively; this probably means that there was no difference in the results between the two age groups or that it was a coincidence that these results were obtained in older women. They declared that the outcome in women under 50 is the same in a large case-control study of 422 cases in women aged 40-49 and that in older women it may be explained by differences in social behavior. Moreover, they reported that in Sweden, the difference in BC risk could be explained by the difference in drinking habits in the two age groups due to the liberalization of social practices at the end of the Second World War. (Holmberg et al., 1995). The study performed by Garland et al., showed that a positive association was observed only in women aged 23–30 years, the estimated risk was OR = 1.72 (95% CI 1.01–2.91), they exhibited that the type of this study being prospective, the results are affected by recall bias. The effect of the preclinical disease leads to an unlikely bias because, despite excluding cases diagnosed early in follow-up, the results remained unchanged. This result was due to misclassification of alcohol consumption. (Garland et al., 1999). In northern Italy, they suggested, through a study, a moderate positive relationship between alcohol consumption and breast cancer risk, limited to higher levels of consumption; the estimated risk of BC was OR=2.1(IC 95%1.1-3.9). The same results were found in other case-control studies in northwestern Italy; this result can be explained by alcohol consumption behaviors among women in Italy. This study announced that to assess the effect of alcohol consumption on the risk of CB in Italy, it is preferable to study some other factors of alcohol consumption such as the duration of consumption and the age at the first exposure to further explain the high consumption of wine in this population (Ferraroni et al., 1991).

In contrast, three studies found no association between alcohol consumption and breast cancer risk. They related this difference to other factors. Schatzkin et al., declared that in the

Framingham Heart Study cohort: consumption of 5g/day or more had a risk of OR=0.8 (IC 95% 0.5-1.2) ; they explain that misclassification and mismeasurement of alcohol consumption could reduce a positive relative risk towards 1.0 (Schatzkin et al., 1989). Kim et al., showed that the diagnosis of BC in younger women was likely related to genetic factors rather than environmental factors such as alcohol consumption. In addition, they announced that a higher increase in the risk of BC is related to family history and a low level of alcohol consumption in younger women (Kim et al., 2017). Finally, in a prospective cohort study in Japan, Kawai et al., found that BC risk was unrelated to drinking history, drinking initiation age, and drinking frequency, compared to Western countries, providing evidence that alcohol consumption is an important risk factor for BC. They explained this difference as follows: First, the differences in lifestyle factors between Japanese women and women from Western countries. Second, differences and misclassification of variables between study areas that may affect risk (Kawai et al., 2011).

Conclusion

In summary, all data mentioned and discussed previously indicate a positive association between alcohol consumption and CB risk at different consumption levels, and the risk estimate was influenced by other factors and variables such as drinking habits, age groups, type of alcohol, etc. Further research is recommended to examine this association using all factors and variables to find an accurate estimate of BC risk.

- **Ethics statement:** N/A.
- **Conflict of interest:** The authors declare that they have no competing interests.

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