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Alcohol consumption does not increase the risk of surgical wound complications in breast cancer patients

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Abstract

Alcohol consumption, despite influencing several organic processes, has been scarcely studied regarding the risk of developing surgical wound complications after surgical breast cancer treatment. The aim of this study was to analyse the association between alcohol consumption and the development of surgical wound complications in women undergoing surgical treatment for breast cancer. A prospective cohort study was conducted, comprising 486 women between 40 and 69 years old, interviewed during the preoperative period and followed up for 30 days. The occurrence of seroma, necrosis, surgical site infection (SSI), dehiscence, ecchymosis, and hematoma were considered as outcomes. Alcohol consumption during the 30 days prior to surgery was reported by 20.8% of the patients, with 8.4% being occasional consumers and 12.4% regular consumers. Binge drinking was reported by 10.2% of the women. The presence of surgical wound complications was observed in 65.2%. The most frequent complications were seroma (54.3%), necrosis (17.7%), and SSI (7.8%). No statistically significant association between alcohol consumption and the development of cicatricial complications was observed.

KEYWORDS

alcohol-related disorders, breast neoplasms, complications, surgical wound

1 | INTRODUCTION

Breast cancer is the most common neoplasia among women, accounting for 2 088 849 million new cases per year worldwide in 2018[1] and about 58% of cancer-related deaths among women in less developed countries.[2]

Therapeutic modalities consist mainly in surgery and radiotherapy as locoregional treatments and hormone therapy and chemotherapy as systemic treatments. Although surgical treatments have advanced in recent years, due to the incorporation of less aggressive techniques, several surgical wound complications (SWC) have been described. Murthy et al observed that 9% of 1065 patients with breast cancer presented SWC.[3] According to McNeely et al these postoperative complications may increase morbidity risks, delaying possible systemic therapies and radiotherapy, in addition to delaying rehabilitation.[4]

Among SWC, surgical site infection (SSI) has been pointed out in several studies as the most common postoperative complication in breast surgeries.[5-7] Other common complications include necrosis, seroma, dehiscence, and hematoma.[8,9]

The relationship between alcohol consumption and the risk of developing certain types of cancer has been well established. Alcohol is considered a causal factor for cancers of the lip and oral cavity, nasopharynx, and pharynx, larynx, oesophagus, intestine, female breast, liver, and intrahepatic bile ducts.[10,11] Recently, Thuler et al demonstrated that 5.0% of breast cancer cases in Brazil

can be attributed to alcohol consumption.[12] In the same study, the proportion of women with breast cancer who consumed alcoholic beverages was estimated at 13.3%.

However, although the consumption of alcoholic beverages interferes in several organic processes, its effects related to postoperative complications have been scarcely studied, especially regarding SWC after surgical breast cancer treatment. After an extensive literature review, only one study was identified, in which the authors observed a significant association between alcohol consumption and the development of cicatricial complications following surgical breast cancer treatment.[13] The authors observed that women who consumed over 15 drinks per week were three times more likely (OR: 3.81 95% CI 1.11-8.84) to develop SSI after surgery for breast cancer treatment. Other studies analysed early events, such as local or regional recurrence, another primary breast tumour, distant metastasis or death, without studying SWC.[14,15] On the other hand, the possibility that early interventions aimed at reducing alcohol consumption reduce the risk of complications was recently pointed out in a randomised clinical trial. Tonnesen et al concluded that patients who consumed 60 to 420 g of alcohol per day displayed significantly reduced postoperative morbidities when they discontinued the habit 4 weeks before being submitted to colorectal resection surgery.[16]

A recent statement by the American Society of Clinical Oncology (ASCO) pointed out that the impact of alcohol consumption on the surgical, radiotherapeutic, and chemotherapeutic treatment of cancer patients is still relatively unknown, and that research is required in this regard.[17]

The high magnitude of alcoholic beverage consumption among Brazilian women, the risk of postoperative complications in breast cancer patients and the possibility of prevention of eventual complications through early interventions justify the present study, which aimed to analyse the association between alcohol consumption and the development of surgical wound complications in women undergoing surgical treatment for breast cancer.

Key Messages

- the consumption of alcoholic beverages interferes in several organic processes, nevertheless its effects related to postoperative complications have been scarcely studied. The possibility of prevention of eventual complications through early interventions justify the present study
- the aim of this study was to analyse the association between alcohol consumption and the development of surgical wound complications in women undergoing surgical treatment for breast cancer
- a high percentage of women (65.2%) developed surgical wound complications, and alcohol consumption was reported by 20.8% of the patients in the 30 days prior to surgery
- however, no statistically significant association between alcohol consumption and the development of surgical wound complications was observed

2 | MATERIALS AND METHODS

2.1.1. | Study design and population

A prospective cohort study comprising 40 to 69 year old women diagnosed with breast cancer (C50 according to the 10th revision of the International Classification of Diseases and Related Health Problems—ICD 10), indicated for surgical treatment at the Cancer III Hospital (HCIII), belonging to the National Cancer Institute (INCA), Brazil, was carried out. Women with indication for immediate breast reconstruction, bilateral breast cancer with a previous history of cancer, submitted to diagnostic surgery or who underwent plastic surgery concomitant to surgical treatment, as well as those with difficulty to respond to the questionnaires, were excluded from the study.

An SSI incidence of 10% was considered for the sample size calculation.[13,18,19] Assuming a significance level of 5% and a precision of 3%, 384 patients would be necessary. In addition, to identify a 50% greater relative risk (RR) of postoperative complications among those exposed to alcohol consumption (RR = 1.5), with the complication frequency among nonexposed patients estimated at 15% for a level of significance of 5%, an 80% test power, and a two-tailed hypothesis test, 489 women would be necessary. From April 2014 to July 2015, all women hospitalised for surgical breast cancer treatment were evaluated regarding the study eligibility criteria and clarified as to its objectives, evaluations, and nonmandatory participation. All patients signed an informed consent before being included in the study.

2.1 | Alcohol consumption

Alcohol consumption data during 30 days prior to inclusion into the cohort were collected using an adaptation of the Behavioural Risk Factor Surveillance System (BRFSS)

TABLE 1 Patient and tumour characteristics in women with breast cancer according to alcohol consumption

Variables	Total n (%)	Alcohol consumption			P
		No consumption (0 drinks)/wk n = 385 (79.2%)	Occasional consumption (≤1 drink/wk) n = 41 (8.4%)	Regular consumption (>1 drink/wk) n = 60 (12.4)	
Age					
Mean (±SD)	55.54 (8.12)	55.85 (8.13)	54.18 (8.42)	54.18 (7.86)	.304
Race/skin colour					.365
White	243 (50.0)	196 (50.9)	22 (53.7)	25 (41.7)	
Non-white[a]	243 (50.0)	189 (49.1)	19 (46.3)	35 (58.3)	
School Education (y)					.901
≤8	212 (43.6)	172 (44.7)	16 (39.0)	24 (40.0)	
9-11	198 (40.7)	153 (39.7)	19 (46.3)	26 (43.3)	
>11	76 (15.6)	60 (15.6)	6 (14.6)	10 (16.7)	
Marital status					.651
With partner	270 (55.6)	218 (56.6)	21 (51.2)	31 (51.7)	
Without partner	216 (44.4)	167 (43.4)	20 (48.8)	29 (48.3)	
Current work					.949
Yes	277 (57.0)	218 (56.6)	24 (58.5)	35 (58.3)	
No	209 (43.0)	167 (43.4)	17 (41.5)	25 (41.7)	
Body mass index					.970
< 25	101 (22.3)	81 (22.4)	8 (22.9)	12 (21.1)	
≥ 25	352 (77.7)	280 (77.6)	27 (77.1)	45 (78.9)	
Smoking					**<.001**
Smokers/ex-smokers	197 (40.5)	138 (35.8)	16 (39.0)	43 (71.7)	
Never smoked	289 (59.5)	247 (64.2)	25 (61.0)	17 (28.3)	
Physical activity in the last 30 d					.122
Yes	405 (83.3)	314 (81.6)	37 (90.2)	54 (90.0)	
No	81 (16.7)	71 (18.4)	4 (9.8)	6 (10.0)	
Charlson index					.462
Without comorbidity	399 (82.1)	312 (81.0)	36 (87.8)	51 (85.0)	
With comorbidity	87 (17.9)	73 (19.0)	5 (12.2)	9 (15.0)	
Arterial hypertension					**.018**
Yes	233 (47.9)	180 (46.8)	15 (36.6)	38 (63.3)	
No	253 (52.1)	205 (53.2)	26 (63.4)	22 (36.7)	
Clinical staging					**.015**
<IIB	308 (70.6)	232 (67.4)	31 (79.5)	45 (84.9)	
≥IIB	128 (29.4)	112 (32.6)	8 (20.5)	8 (15.1)	
Histological type					.280
Ductal invasive	388 (79.8)	313 (81.3)	31 (75.6)	44 (73.3)	
Others	98 (20.2)	72 (18.7)	10 (24.4)	16 (26.7)	
Oestrogen receptor					**.007**
Positive	348 (74.7)	264 (71.5)	33 (82.5)	51 (89.5)	
Negative	118 (25,3)	105 (28.5)	7 (17.5)	6 (10.5)	

(Continues)

TABLE 1 (Continued)

Variables	Total n (%)	Alcohol consumption			P
		No consumption (0 drinks)/wk n = 385 (79.2%)	Occasional consumption (≤1 drink/wk) n = 41 (8.4%)	Regular consumption (>1 drink/wk) n = 60 (12.4)	
Progesterone receptor					.065
Positive	282 (60.5)	214 (58.0)	26 (65.0)	42 (73.7)	
Negative	184 (39.5)	155 (42.0)	14 (35.0)	15 (26.3)	
HER2					.075
Positive	96 (21.4)	79 (22.1)	7 (18.9)	10 (18.2)	
Negative	353 (78.6)	278 (77.9)	30 (81.1)	45 (81.8)	
ASA					.072
≤II	445 (93.1)	354 (93.4)	34 (85.0)	57 (96.6)	
>II	33 (6.9)	25 (6.6)	6 (15.0)	2 (3.4)	
Surgery type					.072
Radical	278 (57.2)	230 (59.7)	21 (51.2)	27 (45.0)	
Conservative	208 (42.8)	155 (40.3)	20 (48.8)	33 (55.0)	
Axillary surgery					**.037**
No	34 (7.0)	25 (6.5)	04 (9.8)	05 (8.3)	
Axillary lymphadenectomy	264 (54.3)	223 (57.9)	18 (43.9)	23 (38.3)	
Sentinel lymph node biopsy	188 (38.7)	137 (35.6)	19 (46.3)	32 (53.3)	
Neo adjuvant chemotherapy					**.016**
Yes	220 (45.3)	187 (48.6)	14 (34.1)	19 (31.7)	
No	266 (54.7)	198 (51.4)	27 (65.9)	41 (68.3)	

Note: ASA, classification of physical status according to the scale of the American Society of Anesthesiologists; HER2, Receptor for human epidermal growth factor-type 2.

Note: In bold the statistically significant associations.

[a]Non-white = 86 (17.7%) black, 155 (31.9%) brown e 2 (0.4%) yellow or indigenous.

questionnaire.[20] A standard dose (equivalent to 12.5 g of ethanol) was considered as 360 mL of beer, 150 mL of wine, 45 mL of distilled beverages or a small bottle or can of ice beverage. In order to help women remember their alcohol consumption in the last 30 days, an illustrative figure was used in which the different doses were considered according to the type of drink. Alcohol consumption was stratified as nonconsuming, occasional use (up to one dose per week), and regular use (two or more doses per week). The choice of one dose per week as a cutoff point was based on the level of intake among the cohort consumers (median four doses per month). In addition, binge drinking was considered as the consumption of more than four doses on a single occasion.[21]

2.2 | Outcomes

Women were interviewed during the preoperative period and followed up for 30 days or until discharge from the curative outpatient clinic, through the evolution of nursing records. The following SWC were analysed: seroma, necrosis, dehiscence, hematoma, ecchymosis, and SSI. The data were collected from hospital chart records.

2.3 | Covariables

The following covariables were assessed: age at the time of surgery, race/skin colour (according to the Brazilian Institute of Geography and Statistics—IBGE), schooling (years of study), marital status, working status when breast cancer was diagnosed, Body Mass Index (BMI), smoking habits, physical activity in the last 30 days, Charlson Comorbidity Index, presence of arterial hypertension, clinical staging, histological type, oestrogen receptor, progesterone receptor, Her2, physical status according to the American Society of Anesthesiologists (ASA) scale, type of surgery, axillary lymphadenectomy

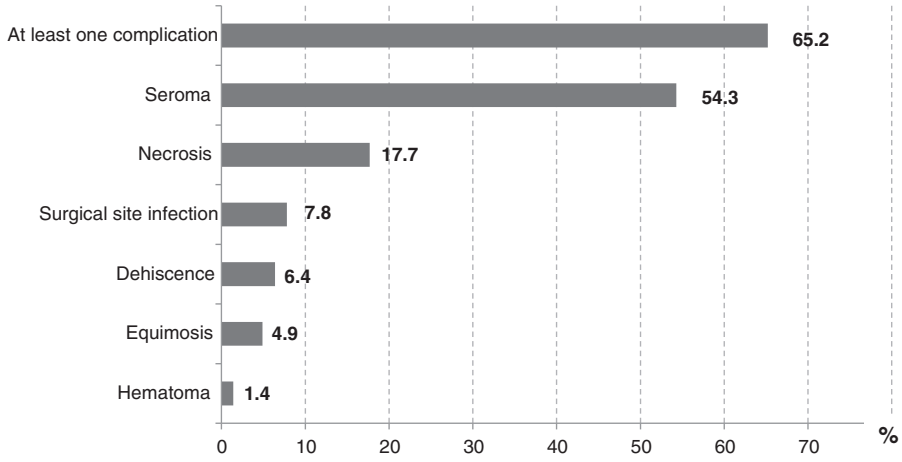

FIGURE 1 Incidence of surgical wound complications

TABLE 2 Risk of presenting surgical wound complications according to alcohol consumption

Variables	With the complication *N*[a] (%)	Without the complication *N*[a] (%)	Crude OR[b] (95% CI)	*P* value
At least one complication				
No consumption	248 (80.5)	132 (78.6)	1	
Occasional consumption	27 (8.8)	13 (7.7)	1.12 (0.55-2.21)	.777
Regular consumption	33 (10.7)	23 (13.7)	0.76 (0.43-1.35)	.356
Seroma				
No consumption	216 (81.8)	166 (76.5)	1	
Occasional consumption	20 (7.6)	20 (9.2)	0.77 (0.40-1.48)	.429
Regular consumption	28 (10.6)	31 (14.3)	0.69 (0.40-1.20)	.193
Necrosis				
No consumption	66 (76.7)	318 (80.3)	1	
Occasional consumption	7 (8.1)	33 (8.3)	1.02 (0.43-2.41)	.960
Regular consumption	13 (15.1)	45 (11.4)	1.39 (0.71-2.73)	.335
Surgical site infection				
No consumption	33 (84.6)	348 (79.5)	1	
Occasional consumption	2 (5.1)	38 (8.7)	0.56 (0.13-2.40)	.431
Regular consumption	4 (10.3)	52 (11.9)	0.81 (0.28-2.38)	.704
Dehiscence				
No consumption	27 (87.1)	356 (79.1)	1	
Occasional consumption	1 (3.2)	39 (8.7)	0.34 (0.05-2.56)	.293
Regular consumption	3 (9.7)	55 (12.2)	0.72 (0.21-2.45)	.598
Equimosis				
No consumption	17 (70.8)	363 (80.1)	1	
Occasional consumption	4 (16.7)	36 (7.9)	2.37 (0.76-7.43)	.138
Regular consumption	3 (12.5)	54 (11.9)	1.19 (0.34-4.18)	.790
Hematoma				
No consumption	6 (85.7)	376 (79.7)	1	
Occasional consumption	0 (0)	40 (8.5)	0	.998
Regular consumption	1 (14.3)	56 (11.9)	1.12 (0.13-9.47)	.918

[a]Differences in total are due to missing data.
[b]No adjustment for potential confounders was required seeing that no statistically significant associations were found between groups.

(AL), sentinel lymph node biopsy (SLNB), and neo-adjuvant chemotherapy.

2.4 | Statistical analyses

A descriptive analysis of the study population was carried out through central tendency and dispersion measures for the continuous variables, and frequency distribution (absolute and relative) for the categorical variables. Comparisons between groups were carried out by the chi-square test or Fisher's exact test, when indicated. Values at $P < .05$ were considered statistically significant. The identification of factors associated with the risk of presenting SWC in women who both occasionally and regularly consume alcohol was carried out by calculating crude and adjusted odds ratios. Age, smoking, and neo adjuvant chemotherapy were considered for adjustments. The SPSS (Statistical Package for the Social Sciences) version 21.0 was used for the data analyses.

3 | RESULTS

A total of 486 women with mean age of 55.5 years (±8.1) were included. Most self-reported white skin colour (50.0%), had a companion (55.6%), had up to 8 years of school education (43.6%), were working when diagnosed with the disease (57.0%) and were nonsmokers (59.5%) (Table 1).

Alcohol consumption in the 30 days prior to surgery was reported by 20.8% of the patients, where 8.4% were occasional consumers and 12.4%, regular consumers. The large majority of women (99.4%) consumed less than seven drinks per week. Only three patients (0.6%) consumed seven or more drinks per week. Binge drinking was reported by 49 women (10.2%). Regular consumption was more frequent among smokers ($P < .001$) and among those presenting systemic arterial hypertension ($P = .018$) (Table 1).

Regarding clinical and histopathological characteristics, the predominant histological tumour type was infiltrating ductal carcinoma (79.8%). Most women tested positive for oestrogen (74.7%) and progesterone (60.5%) receptors and were Her2 negative (78.6%). Mastectomy was the most frequent breast surgery (57.2%), mostly associated to AL (54.3%). Most women did not undergo neoadjuvant chemotherapy (54.7%) (Table 1).

The regular consumption of alcoholic beverages was more frequent among those in the initial clinical stage ($P = .015$), with positive oestrogen receptors ($P = .007$), submitted to SLNB ($P = .016$) and who did not undergo neo-adjuvant chemotherapy ($P = .016$) (Table 1).

Of the 486 women included in the study, 315 (65.2%) presented some type of SWC. The most frequent complications were seroma (54.3%), necrosis (17.7%), and SSI (7.8%) (Figure 1).

Regarding the hypothesis postulated herein, the consumption of alcoholic beverage in the last 30 days before surgery, after adjustments, was not associated to the surgical wound healing process in both occasional and regular alcohol consumers (Table 2). No adjustment for potential confounders was required seeing that no statistically significant associations were found between groups.

4 | DISCUSSION

This study included women diagnosed with breast cancer at a single public referral center for cancer treatment. Alcohol consumption during the previous 30 days was reported by 20.8% of the women. After surgery, surgical wound complications were observed in 65.2%, not associated with occasional or regular alcohol consumption.

In this study, the main observed cicatricial complications were seroma (54.3%), necrosis (17.7%), and SSI (7.8%). Vilar-Compte et al reported the most frequent postoperative complications as SSI (20.5%), necrosis (14.5%), and dehiscence (11.2%).[19] In contrast, seroma was the most incident cicatricial complication observed in the current study. Giuliano et al also pointed out seroma as the main complication (8.0%), while patients who underwent SLNB presented a lower risk of seroma (1.5%) than those submitted to complete AL after SLNB (15.5%).[22]

In turn, Rose et al observed that hematoma (10%) was the most common complication in a study comprising 946 patients with primary breast cancer who underwent mastectomy, partial mastectomy, and oncoplastic surgery.[23] In another study, Davis et al observed a 2.3% incidence of SSI in 38 739 patients who underwent mastectomy without reconstruction between 2005 and 2009.[7] These authors found complication rates lower than those observed in the current study. The high rate of complications in our cohort may be explained by the advanced clinical stage at diagnosis (29.4 had clinical staging ≥ IIB) and the type of surgery the patients were submitted to (57.2% had radical surgery), different to that reported by other series with breast cancer patients.[5-9]

Although the present study did not indicate a significant association between alcohol consumption and the development of post-surgery cicatricial complications for breast cancer, Sørensen et al observed that alcohol consumption (>14 doses/wk) was associated with the development of postoperative cicatricial complications in breast cancer surgeries.[13] In addition, Tonnesen et al

found that patients with colorectal cancer displaying heavy alcohol consumption (≥5 doses/day) presented more complications during the postoperative period.[16] In addition, these authors observed that, depending on the abstinence period before surgery, some organic dysfunctions could be avoided. Similarly to the present results, a systematic review and meta-analysis conducted by Shabanzadeh and Sørensen[24] shows that alcohol drinking was not significantly associated with the incidence of surgical site infection and anastomotic leakage after colorectal, general, breast, gynaecological, head and neck, orthopaedic, spinal, urological, and vascular surgeries.

On the other hand, the study by Simonsson et al pointed to an association between alcohol consumption and risk reduction concerning disease recurrence and distant metastasis.[15] However, in that study, cicatricial complications were not analysed. In contrast, Kwan and colleagues observed that regular consumption of alcoholic beverages (≥6.0 g/day) by postmenopausal women increased the recurrence risk of breast cancer.[14]

Considering other cancer topographies, Hollenbeck et al found that at least 30.5% of the patients submitted to radical cystectomy presented some type of complication in the postoperative period, and that one of the factors associated with the development of these complications was alcohol consumption in the preoperative period.[25] In addition, the authors affirmed that the preoperative process, alongside specific interventions directed to each patient, are essential for postoperative morbidity reduction and quality of life improvement.

This study presents certain limitations. In addition to memory bias, due to the difficulty of women recalling the consumption of alcoholic beverages in the previous 30 days, it is possible that self-reported consumption may have been underestimated. Because the sample comprised women recently diagnosed with breast cancer and in a preoperative condition, it can be assumed that many changed their lifestyle since their diagnosis, reducing alcohol consumption in the days prior to surgery. In this case, female consumers were considered nonconsumers, reducing the risk detected by the research. Another possibility is that the nonanonymity of the research may have reduced truthfulness, leading patients to respond to what would be socially desirable, with an intentional reduction in the reported frequency of alcohol consumption. In addition, the measurement of alcohol consumption was based on self-reports and not biochemically validated and could be subject to recall or measurement bias. A significant difficulty in comparing the results of the present study with those of other authors was also noted, because most of the recent studies analyse complications after breast reconstruction surgery, in contrast to the characteristics assessed in the present study. Another limitation consists in the instrument used to quantify alcohol consumption. After searching specialised scientific literature, it was observed that most questionnaires aimed at evaluating alcoholic beverage consumption validated for Brazil verify consumption on a single occasion, studying acute effects. Because of this, it was then decided to apply an adaptation of the BRFSS (2012). Consumption underestimation may have occurred due to the consideration of only the previous 30 days, not identifying patients who consumed alcoholic beverages in previous periods and whose chronic effect could have interfered in postoperative complication risks. The used cut-off (>1 drink/wk) for regular alcohol consumption may have been inappropriate to perform a proper a dose–response analysis. Thus, information on the consumption of alcoholic beverages in the postoperative period, until the healing process is completed, should be the subject of future studies, given potential interference of this activity in the healing process.

Study strengths include an adequate number of participants for the desired statistical analyses obtained by previous sample calculations and the fact that this is one of the first assessments to evaluate the association between alcoholic beverage consumption and the risk of developing postoperative complications in women with breast cancer. In addition, measures regarding alcohol consumption were carried out using a standardised instrument.

5 | CONCLUSIONS

After surgery for female breast cancer treatment, a high percentage of women (65.2%) developed SWC. Alcohol consumption in the 30 days prior to surgery did not interfere in the development of these complications.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

ETHICAL ASPECTS

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

All the included women accepted participation in the study by signing a free and informed consent form. This study was approved by the INCA Ethics and Research Committee under number CAAE 24529113.0.0000.5274 on January 16, 2014.

Informed consent was obtained from all individual participants included in the study.

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