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Title page

Alcohol consumption is a modifiable risk factor for breast cancer: Are women aware of this relationship?

Roberta Agabio^a, M.D., Clelia Madeddu^b, M.D., Paolo Contu^b, M.D., Sofia Cosentino^b, Ph.D., Monica Deiana^c, Ph.D., Elena Massa^b, M.D., Alessandra Mereu^b, Ph.D., Carola Politi^b, M.D., Claudia Sardu^b Ph.D., Julia M. A. Sinclair^d, FRCPSYCH D.PHIL.

Roberta Agabio and Clelia Madeddu equally contributed

Claudia Sardu and Julia M. A. Sinclair equally contributed

^aDepartment of Biomedical Sciences, Section of Neuroscience and Clinical Pharmacology, University of Cagliari, Italy

^bDepartment of Medical Sciences and Public Health, University of Cagliari, Italy

^cDepartment of Biomedical Sciences, Unit of Experimental Pathology, University of Cagliari, Italy

^dFaculty of Medicine, University of Southampton, Southampton, UK

Author for correspondence

Roberta Agabio, M.D.

Department of Biomedical Sciences, Section of Neuroscience and Clinical Pharmacology

University of Cagliari

Cittadella Universitaria, S.S. 554, km. 4.500

I-09042 Monserrato (CA), Italy

Phone: +39 070 6754325

Fax: +39 070 6754320

E-mail: agabio@unica.it

Running title

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Key words

Alcohol, breast cancer, risk factor, unit of alcohol, awareness

Abstract

Aims: Despite alcohol consumption being a dose-dependent risk factor for breast cancer, a recent study conducted in the UK found less than 20% of women attending breast screening programmes were aware of this relationship and proposed proper information campaigns need to be conducted. We aimed to investigate the awareness of this relationship among a related sample of Italian women to evaluate whether similar information campaigns should also be conducted in Italy.

Methods: The questionnaire used by the UK study was translated into Italian, slightly modified for the Italian context, validated, and submitted to a sample of Italian women.

Results: Overall 507 women were interviewed. Among them, 160 were classified as breast cancer screening attenders (SG), 44 as symptomatic breast clinic attenders (CAG), and 303 as non-screening group (NSG). Alcohol was correctly identified as a risk factor for breast cancer by 16.9%, 11.4%, and 14.9% of participants of SG, CAG, and NSG, respectively without differences between the three groups. Despite the methodological differences, the rates of participants who correctly identified alcohol as a risk factor among women attending breast screening programs were surprisingly similar between the study conducted in UK (15.7%) and the present study (16.9%).

Conclusions: The results of the present study confirm the limited awareness of the relationship between alcohol consumption and risk of developing breast cancer among women and suggest the urgent need to conduct proper awareness-raising campaigns to counter this in the Italian female population.

Short Summary

Less than 20% of women across different populations were aware of the relationship between alcohol consumption and risk of developing breast cancer. There is an urgent need to conduct proper awareness raising campaigns in the Italian female population.

INTRODUCTION

Breast cancer is the most common type of cancer worldwide and its incidence is rising (Fitzmaurice et al., 2017). Globally, one in eight to ten women develop this cancer during their life and, although the efficacy of treatment for breast cancer has improved, the mortality is still very high (Harbeck and Gnant, 2017). Potentially modifiable lifestyle risk factors account for approximately 30% of breast cancers, with obesity and alcohol being the two greatest (Howell et al., 2014). Among post-menopausal women, the World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) has estimated that over 40% of breast cancer could be prevented by reductions in alcohol, excess body weight, and inactivity (WCRF/AIRC 2018).

The relationship between alcohol consumption and risk of developing breast cancer is dose dependent from low levels (Seitz et al., 2012; Scocciati et al., 2014; Chen et al., 2016; GBD 2016, 2018; Jung et al., 2016; Shield et al., 2016; Freudenheim, 2020), with the risk increasing between 2% -12% for each additional standard drink/day (a drink contains approximately 10 to 12 grams of alcohol; Scocciati et al., 2014). One meta-analysis of 113 studies evaluated the risk of breast cancer in women who drank at 'light' levels (i.e. up to one drink/day) and 'heavy' levels (three or more drinks/day) compared to women who did not consume alcohol (Seitz et al., 2012). They found that both light and heavy drinkers have a significant increase in the risk of breast cancer of the order of 4% and 40-50%, respectively compared to women who do not consume alcohol (Seitz et al., 2012). Accordingly, the authors of the meta-analysis concluded that women should not exceed one drink/day, and women at elevated risk for breast cancer should avoid alcohol or consume alcohol only occasionally (Seitz et al., 2012). Another study investigated the relationship between alcohol consumption and the risk of developing breast cancer in a large sample of women recruited in ten European countries (Romieu et al., 2015). The results confirmed the dose

dependent relationship between alcohol consumption and risk to develop breast cancer and demonstrated that breast cancer risk is stronger among women who start drinking prior to first full-time pregnancy (Romieu et al., 2015).

Although historically alcohol consumption is higher in men than women, the gap between men and women in alcohol use is closing (Slade et al., 2016), with the rate of women who consume alcohol rising. According to the World Health Organization (WHO), in 2016, in Europe 51.4% of women consumed alcohol at least occasionally. Among those who drink, 24.5% of women were episodic heavy drinkers (≥ 40 g; WHO, 2018).

Considering that breast cancer is the most frequent cancer among women and that more than 50% of women consume alcohol at least occasionally, women should be aware that alcohol consumption increases the risk of developing breast cancer. Nevertheless, a recent UK study found that less than 20% of a sample of women attending a breast screening program and less than 50% of a sample of healthcare professionals working in the field identified alcohol as a breast cancer risk factor (Sinclair et al., 2019). The same study found that 66.5% of attenders drank alcohol but 56.6% were unable to estimate the alcohol content of any of four commonly consumed alcoholic drinks.

We hypothesized that the association between alcohol consumption and breast cancer was also largely unknown among Italian women and, if this was the case, that similar preventive programmes be proposed to increase women awareness of this relationship. Accordingly, we planned to replicate the UK study among a similar sample of Italian women using the same questionnaire modified for the Italian context to evaluate (1) the level of knowledge about alcohol as a modifiable breast cancer risk, (2) levels of alcohol consumption, and (3) the level of awareness of alcohol content in most commonly consumed alcoholic drinks.

METHODS

Design, participants, and groups

The study was conducted in collaboration with the lead author of the UK study (Sinclair et al., 2019) and an oncologist (CM) based, in Cagliari, Italy, where we aimed to conduct our study. Based on the original study we planned to recruit at least 100 women attending breast screening program, 100 symptomatic breast clinic attenders, and 50 healthcare professionals. The study was approved by the Ethic Committee of the University Hospital of Cagliari, Italy (Prot. PG /2020/2963; January 29, 2020). Unfortunately, after one week, restrictions imposed due to Covid-19 prevented us recruiting further in person, so we adapted the study to interview women by phone or video call. On the day of the interview, patients were informed of the study aims and assured that their answers would be kept strictly confidential.

Based on the answer to “Have you ever been investigated/screened for breast cancer?” (see question 9, supplementary material), we divided our sample into the following three groups of participants: (i) screening group (SG), (ii) cancer group (CAG), and (iii) non-screening group (NSG). We included in the ‘cancer group’ participants who identified as ‘being investigated following symptoms’ and those who answered ‘been treated for breast cancer’ for the following reasons: 1) the small numbers of participants included in both groups; 2) the different characteristics of these women compared to those of participants included in the SG and in the NSG. The first group (SG) was used to compare the results obtained by the present study to those obtained by women attending breast screening programme in the UK study (UKSG). The level of knowledge about alcohol as a modifiable breast cancer risk, alcohol consumption, and the level of awareness of

alcohol content in most commonly consumed alcoholic drinks were investigated in the total group and in the three different subgroups.

Quantitative data

The questionnaire used by the UK study (Sinclair et al., 2019) was translated into Italian, and some questions were modified for the Italian context, and others were added to investigate further topics like familiarity for breast cancer. Back translation to English was then undertaken and reviewed to ensure consistency of meaning across translation. Using the same method described by Sinclair and colleagues (2019), each free-text response listed by study participants in response to the question “write down anything you think might increase the risk of breast cancer” was coded into the following categories of modifiable risk factors: obesity, alcohol, lifestyle, hormone medications, and smoking. Self-reported height and weight were used to calculate body mass index (BMI). Participants were given four multiple choice questions to test their knowledge of the units of alcohol in four drink types.

The final draft included the first three questions of the Alcohol Use Disorders Identification Test (AUDIT), a 10-question questionnaire developed by the World Health Organization to identify at risk drinking (Saunders et al., 1993). Its first three questions correspond to the AUDIT-C, the short form of the questionnaire (Bush et al., 1998; Bradley et al., 2003). The AUDIT-C has been found to perform well in females when a lower cut-point (AUDIT-C score ≥ 4) is used compared to males (AUDIT-C score ≥ 5) for a ‘positive’ score (Reinert and Allen, 2006). Accordingly, in the present study the cut-off value of AUDIT-C score ≥ 4 was used to identify at-risk female drinkers. Finally, the modified, back-translated questionnaire (see Supplementary 1) was re-translated back into Italian language and administered to a small sample of women to ensure its face validity.

Statistical analyses

Descriptive statistics were used, two-tailed Mann–Whitney test to compare age categories and Chi square tests to assess differences between the groups in demographical and health characteristics, risk factor identification and ability to identify alcohol units.

To explore variables affecting the knowledge of alcohol as risk factor and their interaction or confounding effects, a multivariable logistic regression was undertaken. Knowing that alcohol is a risk factor for breast cancer (yes vs no) was the dependent variable. Socio-demographic variables, sample group (SG, CAG, NSG), alcohol consumption (yes vs no) were the independent variables. Comparison between SG and UKSG was made by estimating 95% confidence intervals (CI). Analysis were conducted using SPSS V.26.

RESULTS

Survey findings

In total 507 women were interviewed; among them, (i) 160 were in the SG, (ii) 44 in CAG, and (iii) 303 in NSG. An overview of their characteristics is shown in Table 1. *Insert Table 1 here*

Participants in the SG and CAG samples did not differ in education levels, relationship status, employment status, general health, BMI, smoking status, alcohol status, and AUDIT score. The two groups differed slightly in age, with women in SG being older than those in CAG (median age: 55 and 52 years, respectively).

Compared to women in SG, those in NSG were younger, less frequently married and employed, more frequently smokers, in good health and healthy/underweight BMI, and had higher levels of education. The two groups did not differ in alcohol status and AUDIT score.

More than 80% of our total sample reported alcohol consumption and 22.7% had AUDIT-C score ≥ 4 without significant differences between the groups.

Comparison between the samples of women attending breast screening programmes in the UK (UKSG) study and in the present study (SG) *Insert Table 2 here*

Table 2 compares the UK and Italian 'breast screening' samples. The two groups did not differ in age distribution, relationship, and employment status. However, the samples differed significantly in terms of BMI, smoking, and alcohol use. Specifically, 81.9% of SG participants compared with 60.4% of UKSG reported any alcohol consumption in the last year, and were more likely to be smokers, but 68.8% of SG were not overweight compared with only 35.6% of UKSG.

Identification of modifiable risk factors *Insert Table 3 here*

Table 3 shows the rates of women who identified obesity, alcohol, lifestyle, hormone medications, and smoking as risk factors for breast cancer. There were no differences in the knowledge of these modifiable factors between the groups in the current study, with alcohol and obesity the two risks least likely to be cited by any group. However, compared to UKSG, a lower rate of SG participants identified obesity. UKSG and SG did not differ in the rates of women who identified alcohol, hormone medications, and smoking as risk factors.

Identification of alcohol as a risk factor for breast cancer by drinking status

In the UK study, personal alcohol consumption was significantly associated with women's knowledge of alcohol as a risk factor for breast cancer (25.2% who drank compared vs 10.9% who did not drink alcohol correctly able to identified alcohol as a risk factor, $p=0.031$). Conversely, we found no association between identification of alcohol as a risk factor for breast cancer and personal alcohol consumption (data not shown). Finally, we found no significant differences in the percentage of women who correctly identified alcohol as a risk factor for breast cancer based on their drinking status between the three groups (data not shown). The multivariate logistic regression did not highlight any confounding or interaction effect and did not identify any variable significantly affecting the probability of knowing the role of alcohol as risk factor for breast cancer.

Able to give units in any of four drinks

In the UK study, overall 56.6% of participants were not able to correctly identify the number of units in any of the four drinks investigated (i.e. a standard glass of wine, pint of beer, litre of cider and bottle of spirits, out of a choice of four options for each one). In the present study, we found much lower rates of participants able to correctly identify the number of units. Specifically 72% of our participants were not able to correctly identify the number of units in any of the four drinks investigated (i.e. a standard glass of wine, pint of beer, litre of Aperol and bottle of spirits, out of a choice of four options for each one); 25.8% correctly identified one or two drinks out of four given, and only 2.2% correctly identified three or four out of four given.

Obesity

There were significant differences in the weight profiles found in the UK and Italian studies. In the UK study, 41.6% of participants were recorded as under/healthy weight, 33% overweight, and 25.4% obese; approximately one-third of each group identified obesity as a risk factor for breast cancer, with obese women being less likely to list obesity like a risk factor. In the Italian study, overall, 72.4% of participants were recorded as under/healthy weight, 19.1% overweight and 8.5% obese (see Table 1). Obesity was identified as a risk factor by low rates of participants without differences between the groups (see Table 3). Awareness that obesity is a risk factor was not associated with weight status, either in the total sample or in the single groups.

DISCUSSION

The present study aimed to replicate the study conducted in the UK (Sinclair et al., 2019) to investigate the awareness of the association between alcohol consumption and breast cancer among a sample of Italian women. We adopted the same questionnaire used in the UK study, modified for the Italian context and back translated to ensure validity. Due to the limitations

imposed by Covid-19, we adapted the recruitment strategy, but despite this methodological difference, the results clearly demonstrate that knowledge of the association between alcohol consumption and breast cancer is also poor among Italian women suggesting that preventive programmes similar to those proposed in the UK study should be also developed in Italy to increase women awareness of this relationship.

In detail, we interviewed a sample of women and divided them according to their replies into three groups, screening group (SG), cancer group (CAG), and non-screening group (NSG). These groups showed some differences between them, but SG participants were sufficiently similar to women attending breast screening programme of the UK study (UKSG). We found that less than 20% of our total sample of women correctly identified alcohol as a risk factor for breast cancer. Among women in our SG sample, alcohol was correctly identified as a risk factor by 16.9% of participants. This rate is surprisingly similar to that found among UKSG (15.7%) (Sinclair et al., 2019). Interestingly, the Italian and UK studies also found that the awareness of the other modifiable risks factors is also poor. For instance, obesity was correctly identified as a risk factor by approximately 30% of participants in the UK study and less than 10% in the present study. As breast cancer is the most common type of cancer in females (Fitzmaurice et al., 2017), it is worrying that women are not aware of the main modifiable risk factors and the results of both the studies underline the urgent need to conduct proper prevention programmes to empower women to understand the benefits of changing unhealthy habits. Furthermore, our results confirm the need to increase the level of awareness of alcohol content of the most consumed alcoholic drinks as most women (72%) of our sample were not able to correctly identified the number of units in any of the four drinks investigated.

A recent study calculated that perfect adherence to the French government's alcohol consumption guidelines (no more than 10 standard alcoholic drinks per week and two per day, with one

alcoholic drink being equal to 10 g pure alcohol) between 2015 and 2050 would prevent more than 61,000 new cases of breast cancer (Ren et al., 2021). Obviously, to adhere to alcohol consumption guidelines, women need to be able to quantify their alcohol consumption into standard units. In fact, the results of both the UK and Italian studies show that most women are not able to correctly identify the number of units in any of alcoholic drinks investigated.

In Italy, breast cancer screening includes a mammogram every 2 years, recommended and free for women between the ages of 50 and 69 years (Ministero della Salute, 2019). This kind of prevention programmes have significant costs, absolutely justified by the frequency of breast cancer and its devastating consequences. However, the results of both the UK and Italian studies suggest that adding a prevention aspect to these screening programmes, or other information campaigns are urgently needed to increase the awareness of the modifiable risks for breast cancer among the female population.

In conclusion, the results of the present study found that the association between alcohol consumption and breast cancer is poor among Italian women and that most women are not able to correctly identify the number of units contained in alcoholic beverages. These results underline the need to develop proper preventive programmes aimed at increasing the women awareness of this relationship (Freudenheim, 2020).

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