



Breast cancer deaths attributable to alcohol consumption: Italy, 2015–2019

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ABSTRACT

A study was conducted to assess the fraction of female breast cancer (BC) deaths attributable to alcohol consumption in Italy. National mortality data for the period 2015–2019 were used along with national estimates of women from the general population exposed to moderate (11–20 gr/day) or heavy (>20 gr/day) alcohol consumption. From 2015 to 2019, 2918 (4.6%) out of 63,428 BC deaths were attributable to alcohol consumption, including 1269 deaths (2.0%) caused by moderate consumption. Study findings could help stakeholders to prioritize programs aimed at reducing alcohol consumption, and to improve ways to effectively communicate alcohol-related health risks, including moderate consumption.

1. Introduction

According to the International Agency for Research on Cancer (IARC), convincing evidence has been already accumulated to establish a causal role of alcohol in the etiology of seven cancer types (lip and oral cavity, oesophagus cancer, colon-rectum, liver, female breast, larynx, and other pharyngeal cancers) [1]. Among these types, BC is the most frequent cancer in females worldwide, accounting for 53,000 new cases and 12,772 deaths in Italy in 2019 [2]. Although not completely understood, the etiologic mechanism of alcohol in the development of BC seems to be linked with an increased estrogen concentration [3,4]. Conversely, the dose-response relationship between alcohol consumption and the risk of BC has been clarified [5,6], highlighting increased risks even at low/moderate consumptions [7,8] and lack of evidence of a threshold effect [9]. Despite strong scientific evidence, however, the role of alcohol consumption on cancer occurrence (including the raised female BC risk) remains underestimated by the general public [10]. In Italy, the alcohol attributable fraction of cancers has been estimated in national and international contests, with projections ranging from 4.2% [11] to 8.5% [12]. The aim of this study was to assess the fraction of BC deaths recorded in Italian women from 2015 to 2019 attributable to alcohol consumption.

2. Methods

The Italian mortality database, managed by Istituto Italiano di Statistica (ISTAT), has been used to select deaths for BC in women from 2015 to 2019. In order to compute the population attributable fraction (PAF) we used: i) representative and accurate estimates of exposure prevalence in the female general population; and ii) relative risks (RR) associated with the exposure.

Estimates of alcohol consumption were obtained from ISTAT's 2019 report [13], which contains data collected by population surveys on consumption of alcohol containing beverages by Italian women from 2003 to 2019. Using the above-mentioned data, and by assuming a latency period of 10 years between exposure and BC death, we assumed as exposures the proportions of alcohol consumers among women in the period 2005–2009. Two categories of exposure were then evaluated: i) moderate alcohol consumption (i.e., 11–20 g/day), and ii) heavy alcohol consumption (more than 20 g/day). Such mutually exclusive categories were from guidelines from the Centers for Disease Control (CDC) [14] and the Italian Minister of Health [15]. Corresponding RRs for the two exposure categories were from the World Cancer Research Fund revision [9]. Accordingly, a RR of 1.13 was used for consumption between 11 g/day and 20 g/day (i.e., for moderate consumption) and a RR of 1.27 was used for consumption above 20 g/day, (i.e., for heavy consumption).

The PAF on BC mortality for moderate and heavy alcohol consumption was calculated using the Levin's formula:

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Abbreviations

- Breast cancer (BC)
- Population Attributable Fraction (PAF)
- International Classification of Diseases version 10 (ICD 10)
- Global Burden of Disease (GBD)
- International Agency for Research on Cancer (IARC)
- Istituto Italiano di Statistica (ISTAT)
- Registry of Causes of Death (RCoD)

$$PAF = \frac{Pe(RR - 1)}{1 + Pe(RR - 1)}$$

where Pe is the proportion of the population exposed, RR is the relative risk of dying for BC. The Pe was considered to be the same in the BC cancer cases and in the general population. The number of female BC deaths attributable to alcohol consumption was calculated by multiplying the PAF for the number of deaths. All statistical analyses were done using the version 9.4 of the software SAS.

3. Results

Out of 1,662,955 deaths registered in Italian women between 2015 and 2019, 63,428 reported BC as the cause of death. In the preceding ten years, the prevalence of moderate use of alcohol containing beverages in Italian women was estimated to be 16.0% -ranging from 17.8% in 2005 to 14.7% in 2009. Accordingly, it was projected that a total of 10,161 women deceased for BC turned out to be exposed to moderate alcohol consumption (Table 1). Overall, 1269 BCE deaths recorded in the 2015–2019 period were attributable to moderate alcohol consumption -i.e., a 2.0% population attributable fraction (Table 1).

Between 2005 and 2009, the percentage of Italian women exposed to heavy alcohol consumption was 9.8% (Table 2). Overall, 1649 BCE deaths recorded in the 2015–2019 period were attributable to heavy alcohol consumption -i.e., a 2.6% population attributable fraction (Table 2).

4. Discussion

In this population-based analysis of death records and data on alcohol consumption of Italian women, we found that 2.0% of all 63,428 BCdeaths was attributable to moderate alcohol consumption (e.g., about 1–2 drink of beer or wine per day) and 2.6% to heavy alcohol consumption (i.e., >2 drinks per day). In absolute terms, the study findings

Table 1
Deaths from female breast cancer attributable to moderate alcohol consumption. Italy, 2015–2019.

Calendar Year	2015	2016	2017	2018	2019	Total
Number of deaths ^a	12,274	12,564	12,789	13,029	12,772	63,428
ISTAT survey:						
Number of estimated exposed cases ^b	2185	2073	2085	1941	1877	10,161
(%)	(17.8)	(16.5)	(16.3)	(14.9)	(14.7)	(16.0)
Population attributable fraction (%)	2.3	2.1	2.1	1.9	1.0	2.0
Number of attributable deaths	282	264	269	248	243	1269

^a ISTAT death registry [2].

^b ISTAT exposure data 2005–2009 [13].

Table 2

Deaths from female breast cancer attributable to heavy alcohol consumption. Italy, 2015–2019.

	2015	2016	2017	2018	2019	Total
Calendar Year						
Number of deaths ^a	12,274	12,564	12,789	13,029	12,772	63,428
ISTAT survey:						
N. of estimated exposed cases ^b	1326	1282	1304	1173	1149	6234
(%)	(10.8)	(10.2)	(10.2)	(9.0)	(9.0)	(9.8)
Population attributable fraction (%)	2.8	2.7	2.7	2.4	2.4	2.6
Number of attributable deaths	344	339	345	313	307	1649

^a ISTAT death registry data [2].

^b ISTAT exposure data 2005–2009 [13].

indicate that, between 2015 and 2019, alcohol consumption was responsible of 2918 BCdeaths (1269 for moderate consumption and 1649 for heavy alcohol consumption). These results are similar of those calculated by Rungay and colleagues where 4.2% of all BC cases in 2020 were attributable to alcohol use [11], but lower than those calculated by the GBD study (i.e., PAF equal to 8.5%) [12]. We also noticed a progressive reduction within the study period in the PAF (i.e., from 2.3% to 1.9% for moderate; and from 2.8% to 2.4% for heavy alcohol consumption) that may mirror lifestyle and cultural changes and increased awareness on health risks posed by alcohol. It is worth noticing that the number of BC deaths attributable to heavy alcohol consumption was slightly higher than that attributable to moderate alcohol consumption. Such results mirror similar findings from previous studies [7,8], and they strength the WHO recommendation on lack of safe level for alcohol consumption.

Some study limitations are worth stressing. A 10-year time lag between exposure and BC death was assumed to properly represent the negative effect of alcohol. Although we are not aware of use of time lag in other investigations, we acknowledge that such assumption may have impacted on study findings. Moreover, RRs of incidence were used as proxies for RRs of death. The use of surveys to evaluate exposure is prone to reporting bias and underreporting that should be accounted for, along with the lack of exposure data stratified for age. Conversely, the main novelty of this study is the projections, using the most recent available data at population level, of PAF of BC deaths according to moderate or heavy levels of alcohol consumption in Italian women.

In conclusion, these data may help stakeholders in implementing programs aimed at reducing alcohol consumption, not only in heavy but also in moderate consumers, and to improve ways to effectively communicate alcohol health-related risks to the general public.

Availability of data and materials: ISTAT data used this article are freely available: see references 2 and 12.

Authors' contribution

LDM, MD, and DS designed the study and drafted the manuscript; MD, FT, EB analyzed data; FG and MP revised the manuscript; All Authors contributed to data interpretation and revised the manuscript for intellectual content.

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Declaration of competing interest

All Authors declare that they have no conflicts of interest.

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