Cancer Association of South Africa (CANSA)

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Fact Sheet and Position Statement on Alcohol Consumption and Cancer Risk

[Picture Credit: Alcohol]

Introduction

The International Agency for Research on Cancer (IARC) is part of the World Health Organization (WHO). Its major goal is to identify causes of cancer. The most widely used system for classifying carcinogens comes from the IARC.

In the past 30 years, the IARC has evaluated the cancer-causing potential of more than 900 likely substances, placing them into one of the following groups:

- Group 1: Carcinogenic to humans
- Group 2A: Probably carcinogenic to humans
- Group 2B: Possibly carcinogenic to humans
- Group 3: Unclassifiable as to carcinogenicity in humans
- Group 4: Probably not carcinogenic to humans

Alcohol was declared a carcinogen (Group 1) in 1988 by IARC. Surprisingly, most people are not aware of alcohol's cancer risk. The IARC reports that no amount of alcohol is safe to drink. Alcohol is clearly identified as causative for cancers of the mouth, pharynx, larynx, oesophagus, colon, rectum, liver, and female breast. IARC re-confirmed that alcohol is a Group 1 carcinogen in 2007 and again in 2009.

Even 'light drinking' has been linked to causing cancers of the mouth, oesophagus and breast. The more one drinks the greater the cancer risk. There is no risk-free level of alcohol consumption. There is always some risk, and the risk increases in accordance with the level of consumption.

Alcohol is blamed for 1 in every 30 cancer deaths worldwide. It will not be surprising if, in the near future, alcoholic beverages are required to have warning labels explaining risk of cancer, hypertension, stroke, atrial fibrillation and cardiomyopathy.
(IARC Working Group; Bagnardi, *et al*. 2013; American Cancer Society; Cancer Research UK).

Researched and Authored by Prof Michael C Herbst
[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Dip Audiometry and Noise Measurement; Diagnostic Radiographer; Medical Ethicist]
Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

Alattas, M., Toss, C.S., Henehan,, E.R. & Naimi, T.S. 2020.

Background: Although more restrictive alcohol control policies (e.g., higher alcohol taxes) are related to lower levels of alcohol consumption, little is known about the relationship between alcohol policies and rates of alcohol-attributable cancer.

Methods: State alcohol policy restrictiveness, as measured by a validated policy scale, were related to state rates of six alcohol attributable cancers in the U.S. from 2006 to 2010 in a lagged, cross-sectional linear regression that controlled for a variety of state-level factors. Cancer mortality rates were from the Center for Disease Control and Prevention's Alcohol-Related Disease Impact application, which uses population-attributable fraction methodology to calculate mortality from cancers of the esophagus, larynx, liver, oropharynx, prostate (male only) and breast (female only).

Results: More restrictive state alcohol policies were associated with lower cancer mortality rates for the six cancer types overall (beta [β] -0.33; 95% confidence interval [CI] -0.59, -0.07), and among men (β -0.45; 95% CI -0.81, -0.10) and women (β -0.21; 95% CI -0.40, -0.02). A 10% increase in the restrictiveness of alcohol policies (based on the mean APS among states) was associated with an 8.5% decrease in rates of combined alcohol-attributable cancers. In all analyses stratified by cancer subtype and sex, the associations were in the hypothesized direction (i.e., more restrictive state policy environments were associated with lower rates of alcohol-attributable cancers), with the exception of laryngeal cancer among women.

IARC Definitions

The International Agency for Research on Cancer (IARC) uses the following definitions to classify cancer causing substances:

Group 1

The agent is carcinogenic to humans. This category is used when there is sufficient evidence of carcinogenicity in humans. Exceptionally, an agent may be placed in this category when evidence of carcinogenicity in humans is less than sufficient but there is sufficient evidence of carcinogenicity in experimental animals and strong evidence in exposed humans that the agent acts through a relevant mechanism of carcinogenicity.

Group 2

This category includes agents for which, at one extreme, the degree of evidence of carcinogenicity in humans is almost sufficient, as well as those for which, at the other extreme, there are no human data but for which there is evidence of carcinogenicity in experimental animals. Agents are assigned to either Group 2A (probably carcinogenic to humans) or Group 2B (possibly carcinogenic to humans) on the basis of epidemiological and experimental evidence of carcinogenicity and mechanistic and other relevant data. The terms probably carcinogenic and possibly carcinogenic have no quantitative significance and are used simply as descriptors of different levels of evidence of human carcinogenicity, with probably carcinogenic signifying a higher level of evidence than possibly carcinogenic.

Group 2A

The agent is probably carcinogenic to humans. This category is used when there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals. In some cases, an agent may be classified in this category when there is inadequate evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals and

strong evidence that the carcinogenesis is mediated by a mechanism that also operates in humans. Exceptionally, an agent may be classified in this category solely on the basis of limited evidence of carcinogenicity in humans. An agent may be assigned to this category if it clearly belongs, based on mechanistic considerations, to a class of agents for which one or more members have been classified in Group 1 or Group 2A.

Group 2B
The agent is possibly carcinogenic to humans. This category is used for agents for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals. It may also be used when there is inadequate evidence of carcinogenicity in humans but there is sufficient evidence of carcinogenicity in experimental animals. In some instances, an agent for which there is inadequate evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals together with supporting evidence from mechanistic and other relevant data may be placed in this group. An agent may be classified in this category solely on the basis of strong evidence from mechanistic and other relevant data.

Group 3
The agent is not classifiable as to its carcinogenicity to humans. This category is used most commonly for agents for which the evidence of carcinogenicity is inadequate in humans and inadequate or limited in experimental animals. Exceptionally, agents for which the evidence of carcinogenicity is inadequate in humans but sufficient in experimental animals may be placed in this category when there is strong evidence that the mechanism of carcinogenicity in experimental animals does not operate in humans. Agents that do not fall into any other group are also placed in this category. An evaluation in Group 3 is not a determination of non-carcinogenicity or overall safety. It often means that further research is needed, especially when exposures are widespread or the cancer data are consistent with differing interpretations.

Group 4
The agent is probably not carcinogenic to humans. This category is used for agents for which there is evidence suggesting lack of carcinogenicity in humans and in experimental animals. In some instances, agents for which there is inadequate evidence of carcinogenicity in humans but evidence suggesting lack of carcinogenicity in experimental animals, consistently and strongly supported by a broad range of mechanistic and other relevant data, may be classified in this group.
(IARC Press Release No 196, 2 November 2009).

Carcinogenicity of Alcohol
Alcoholic beverages are carcinogenic to humans (Group 1). Ethanol in alcoholic beverages is carcinogenic to humans (Group 1). The latter evaluation [of ethanol] is based on by the International Agency for Research on Cancer (IARC):

(i) the epidemiological evidence, which showed little indication that the carcinogenic effects depend on the type of alcoholic beverage
(ii) the sufficient evidence that ethanol causes cancer in experimental animals; and

(iii) the mechanistic evidence in humans who are deficient in aldehyde dehydrogenase that acetaldehyde derived from the metabolism of ethanol in alcoholic beverages contributes to the causation of malignant oesophageal tumours.

Alcohol use is a cause of cancer. Any level of alcohol consumption increases the risk of developing an alcohol-related cancer; the level of risk increases in line with the level of consumption.

There is strong evidence that alcohol causes cancer at seven sites [in the body], and probably others. The evidence supports "a causal association of alcohol consumption" with cancer in the oropharynx (a part of the throat), the larynx, the oesophagus, the liver, the colon, the rectum and the female breast.

There is also growing evidence suggesting a strong link between alcohol and other cancers, such as prostate, pancreatic and melanoma. However, that evidence is not enough at this point to allow researchers to conclude that there is cause-and-effect relationship for these cancers, according to the article.

Moreover, for each of the seven cancers that are directly linked, previous studies have found that there is a "dose-response relationship," meaning that the more alcohol a person drinks, the more likely the person is to develop those cancers.

Di Credico, G., Polesel, J., Dal Maso, L., Pauli, F., Torelli, N., Luce, D., Radoï, L., Matsuo, K., Serraino, D., Brennan, P., Holcatova, I., Ahrens, W., Lagiou, P., Canova, C., Richiardi, L., Healy, C.M., Kjaerheim, K., Conway, D.I., Macfarlane, G.J., Thomson, P., Agudo, A., Znaor, A., Franceschi, S., Herrero, R., Toporcov, T.N., Moyses, R.A., Muscat, J., Negri, E., Vilensky, M., Fernandez, L., Curado, M.P., Menezes, A., Daudt, A.W., Koifman, R., Wunsch-Filho, V., Olshan, A.F., Zevallos, J.P., Sturgis, E.M., Li, G., Levi, F., Zhang, Z.F., Morgenstern, H., Smith, E., Lazarus, P., La Vecchia, C., Garavello, W., Chen, C., Schwartz, S.M., Zheng, T., Vaughan, T.L., Kelsey, K., McClean, M., Benhamou, S., Hayes, R.B., Purdue, M.P., Gillison, M., Schantz, S., Yu, G.P., Chuang, S.C., Boffetta, P., Hashibe, M., Yuan-Chin, A.L. & Edefonti, V. 2020.

Background: Alcohol is a well-established risk factor for head and neck cancer (HNC). This study aims to explore the effect of alcohol intensity and duration, as joint continuous exposures, on HNC risk.
Methods: Data from 26 case-control studies in the INHANCE Consortium were used, including never and current drinkers who drunk ≤10 drinks/day for ≤54 years (24234 controls, 4085 oral cavity, 3359 oropharyngeal, 983 hypopharyngeal and 3340 laryngeal cancers). The dose-response relationship between the risk and the joint exposure to drinking intensity and duration was investigated through bivariate regression spline models, adjusting for potential confounders, including tobacco smoking.
Results: For all subsites, cancer risk steeply increased with increasing drinks/day, with no appreciable threshold effect at lower intensities. For each intensity level, the risk of oral cavity, hypopharyngeal and laryngeal cancers did not vary according to years of drinking, suggesting no effect of duration. For oropharyngeal cancer, the risk increased with durations up to 28 years, flattening thereafter. The risk peaked at the higher levels of intensity and duration for all subsites (odds ratio = 7.95 for oral cavity, 12.86 for oropharynx, 24.96 for hypopharynx and 6.60 for larynx).
Conclusions: Present results further encourage the reduction of alcohol intensity to mitigate HNC risk.

Rehm, J. & Shield, K.D. 2020.
Background: Cancers constitute a major non-communicable disease category globally and in the European Union (EU).
Summary: Alcohol use has been established as a major cause of cancer in humans. Principal cancer agencies agree that the following cancer sites are causally impacted by alcohol: lip and oral cavity, pharynx (excluding nasopharynx), oesophagus, colon and rectum, liver, (female) breast, and larynx. For all of these cancer sites, there is a dose-response relationship with no apparent threshold: the higher the average level of consumption, the higher the risk of cancer incidence. In the EU in 2016, about 80,000 people died of alcohol-attributable cancer, and about 1.9 million years of life were lost due to premature mortality or due to disability. Key messages: Given the above-described impact of alcohol on cancer, public awareness about the alcohol-cancer link needs to be increased. In addition, effective alcohol policy measures should be implemented. As a large part of alcohol-attributable cancers are in low and moderate alcohol users, in particular for females, general population measures such as increases in taxation, restrictions on availability, and bans on marketing and advertisement are best suited to reduce the alcohol-attributable cancer burden.
Keywords: Alcohol use; Cancer; Causes of death; European Union; Population health; Prevention paradox.

Zaitsu, M., Takeuchi, T., Kobayashi, Y. & Jawacgum U, 2020.
Background: Even light to moderate alcohol consumption has been shown to increase cancer incidence. However, this association has not been well characterized in Japan.
Methods: Based on a nationwide, hospital-based data set (2005-2016), a multicenter case-control study was conducted (63,232 cancer cases and 63,232 controls matched for sex, age, admission date, and admitting hospital). The total amount of lifetime alcohol consumption (drink-years) was recalled for each patient by multiplication of the daily amount of standardized alcohol use (drinks per day) and the duration of drinking (years). Odds ratios (ORs) were estimated for overall and specific cancer sites via conditional logistic regression with restricted cubic splines, with adjustments made for smoking, occupational class, and comorbidities. Lifetime abstainers served as the reference group.
Results: Spline curves showed a dose-response association with overall cancer risk: the minimum risk was at 0 drink-years, and the OR at 10 drink-years was 1.05 (95% confidence interval [CI], 1.04-1.06). In comparison with lifetime abstainers, the OR for >0 to 20 drink-years was 1.06 (95% CI, 1.01-1.11). Those who drank 2 drinks or fewer per day had elevated odds for overall cancer risk across all duration-of-drinking categories. The same patterns were observed at light to moderate levels of drinking for most gastrointestinal/aerodigestive cancers as well as breast and prostate cancers. Analyses stratified by sex, different drinking/smoking behaviors, and occupational class mostly showed the same patterns for overall cancer incidence associated with light to moderate levels of drinking.
Conclusions: In Japan, even light to moderate alcohol consumption appears to be associated with elevated cancer risks.

Alcohol Converted to Acetaldehyde in the Body
In the human, alcohol (ethanol) is converted into a toxic chemical called acetaldehyde. Acetaldehyde was previously classified as possibly carcinogenic to humans (Group 2B) because there was inadequate evidence in humans for the carcinogenicity of acetaldehyde, although there was sufficient evidence in experimental animals for the carcinogenicity of acetaldehyde (IARC Monograph 71, 1999).

However, there is now evidence that acetaldehyde can cause cancer by damaging DNA and stopping the cells from repairing the damage. The International Agency for Research on Cancer has also classified acetaldehyde formed as a result of drinking alcohol as being a cause of cancer, along with alcohol itself.

Nearly 2 billion adults worldwide are estimated to consume alcoholic beverages regularly, with an average daily consumption of 13g of ethanol (about one drink). Alcohol consumption has already been shown to cause cancers of the oral cavity, pharynx, larynx, oesophagus, colorectum, liver and female breast; there is now also some evidence for cancer of the pancreas.

The relative risk of breast cancer increases with increasing alcohol intake by about 10% per 10g/day.

Higher risk for East-Asian populations linked to alcohol metabolism. Alcohol consumption results in exposure to acetaldehyde, present in the beverage itself and also formed when the body breaks down alcohol. Alcohol is metabolised to acetaldehyde, (which is a genotoxic chemical), then this acetaldehyde is further metabolised to acetate (a harmless chemical) by enzymes known as aldehyde dehydrogenases (ALDH).

A large proportion of people of east-Asian origin worldwide (up to 30% in some populations) has an inactive enzyme (known as ALDH2*2) that has only about 10% residual enzymatic activity. Carriers of the inactive enzyme are extremely slow to metabolise acetaldehyde, as a result, they experience higher internal levels of acetaldehyde and have much higher risks of oesophageal cancer and cancers of the head and neck compared with individuals with the active enzyme.

The IARC Working Group concluded that acetaldehyde associated with alcohol consumption is carcinogenic to humans (Group 1) and confirmed the classification in Group 1 of alcohol consumption and of ethanol in alcoholic beverages. (IARC Press Release No 196, 2 November 2009; Wold Cancer Research Fund International).

Energy Drinks and Alcohol Consumption

Energy drinks are popular beverages that typically include high levels of caffeine and other ingredients such as taurine, or caffeine-containing herbs, such as guarana. While energy drinks are often consumed alone, they are also frequently used as mixers for alcoholic beverages.

Benson, S., Verster, J.C. & Scholey, A. 2020.

"Studies assessing alcohol mixed with energy drink (AMED) use and drinking behaviors have been largely restricted to student-only cohorts. Thus, it is not known whether evidence from these studies is applicable to non-student populations. This study examined alcohol consumption and involvement in negative alcohol-related consequences among AMED and alcohol-only (AO) users, with the aim of determining whether drinking behaviors differ according to student status. An online survey was conducted in Australia to assess alcohol consumption and alcohol-related consequences following AMED and AO consumption, according to student status. The final sample consisted of 1369 participants. Between-subjects analyses comparing AMED and AO users, confirmed previous findings in that, compared with AO users, AMED users consumed significantly more alcohol, consumed alcohol more frequently and were involved in a greater number of alcohol-related consequences. Within-subjects analyses of AMED users comparing AMED and AO drinking occasions revealed that

significantly less alcohol was consumed and involvement in negative alcohol-related consequences was lower during AMED compared with AO drinking occasions. Regardless of drink type, compared with students, non-students consumed more alcohol, consumed alcohol more frequently and were involved in a greater number of negative alcohol-related consequences. These findings provide further evidence that AMED use is one manifestation of a risk-taking personality and suggest that non-students drink more alcohol, drink more frequently and are involved in a greater number of negative alcohol-related consequences than students."

Alcohol and Cancer Risk

Drinking alcohol increases the risk of mouth and throat cancer (larynx and pharynx), oesophageal cancer, bowel cancer (colon and rectum), liver cancer and female breast cancer. It is not just heavy drinking – even small amounts of alcohol increases cancer risk, but the more one drinks, the greater the risk. One's risk of cancer is the same for all types of alcohol including beer, wine and spirits, and there is no evidence that alcohol helps protect one from any type of cancer.

To reduce the risk of cancer, one should limit one's intake of alcohol or, better still, avoid it all together.

Alcohol consumption has been linked to the following cancers:
Cancer of the mouth
Cancer of the throat
Cancer of the larynx
Cancer of the Colon
Cancer of the rectum
Cancer of oesophagus
Cancer of the liver
Cancer of the breast in females
Endometrial cancer

Rehm, J., Shield, K.D. & Weiderpass, E. 2020.
"In 2016, alcohol consumption was one of the leading risk factors for cancer development and cancer death globally, causing an estimated 376 200 cancer deaths, representing 4.2% of all cancer deaths, and 10.3 million cancer disability-adjusted life years lost, representing 4.2% of all cancer disability-adjusted life years lost. The impact of alcohol consumption on cancer in 2016 varied by age group; the proportion of cancer deaths attributable to alcohol consumption ranged from 13.9% of cancer deaths among people aged 30-34 years to 2.7% of cancer deaths among people aged 80-84 years. The burden of cancers caused by alcohol consumption might be decreased through (i) individual-level and societal-level interventions that reduce alcohol consumption, and (ii) measures that target those risk factors that interact with alcohol consumption to increase the risk of cancer or that directly affect the risk of alcohol-related cancers."

According to a recent study by Burton and Sheron (2018):
"The conclusions of the study are clear and unambiguous: alcohol is a colossal global health issue and small reductions in health-related harms at low levels of alcohol intake are outweighed by the increased risk of other health-related harms, including cancer. There is strong support here for the guideline published by the3 Chief Medical Officer of the UK who found that there is 'no safe level of alcohol consumption'."

Alcohol and Oral and Pharyngeal Cancer
According to the IARC Working Group, a large body of evidence from epidemiological studies of different design, and conducted in different populations, consistently shows that consumption of alcoholic beverages is associated with a higher risk for both oral and pharyngeal cancer, and that the risk increases with increasing amounts of alcohol consumed.

Although tobacco use has been proven to increase the risk of oral cancer, people who use both alcohol and tobacco are at an especially high risk of contracting the disease. Scientists now believe that these substances synergistically interact, increasing each other's harmful effects.

There is now considered to be no safe limit for alcohol intake. Studies have shown that risk of mouth cancer increases with greater alcohol intake (in particular when associated with the use of tobacco).
(Ogden, 2018)

Kawakita, D. & Matsuo, K. 2017.
"In this article, we reviewed the association between alcohol drinking and head and neck cancer (HNC) and its subsites, using the available literature. Alcohol drinking is an established risk factor for HNC, and this association may be stronger among cancers of the oropharynx and hypopharynx than the oral cavity or larynx. In addition, higher alcohol consumption over a shorter period was more harmful than fewer alcohol consumption over a longer period, and the most frequently consumed alcoholic beverages in a population is likely to be associated with the highest risk of HNC in that population. The risk of HNC after ≥ 20 years of alcohol cessation appear to be similar to the risk among never drinkers. The interaction between genetic polymorphisms related to alcohol metabolism and alcohol drinking on the risk of HNC has been noted, and the prevalence of these genetic polymorphisms in each population should be of concern. Finally, the association between alcohol drinking and the survival of individuals with HNC remains unclear, and mortality due to competing causes should be considered in future research to evaluate this association."

Alcohol and Cancer of the Larynx
Studies of different design conducted in Asia, Europe, North America and South America have shown a consistent association between the consumption of alcoholic beverages and the risk for laryngeal cancer. This association increases with increasing amounts of alcoholic beverages consumed and, compared with non-drinkers, regular consumption of about 50g of alcohol per day is associated with an approximately twofold increase in risk. These associations were observed for various types of alcoholic beverages (IARC).

Drinking alcohol, especially spirits, over a long period of time increases a person's risk of getting laryngeal cancer. The risk is much higher for people who are both smokers and heavy drinkers

Kawakita, D. & Matsuo, K. 2017.
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frequently consumed alcoholic beverages in a population is likely to be associated with the highest risk of HNC in that population. The risk of HNC after ≥ 20 years of alcohol cessation appear to be similar to the risk among never drinkers. The interaction between genetic polymorphisms related to alcohol metabolism and alcohol drinking on the risk of HNC has been noted, and the prevalence of these genetic polymorphisms in each population should be of concern. Finally, the association between alcohol drinking and the survival of individuals with HNC remains unclear, and mortality due to competing causes should be considered in future research to evaluate this association."

Alcohol and Cancer of the Oesophagus

More than 50 prospective and case–control studies from most regions of the world found a consistent association between the risk for oesophageal cancer (squamous cell carcinoma) and the consumption of alcoholic beverages.

The risk increases with increasing amounts of alcoholic beverage consumed and, compared with non-drinkers, regular consumption of about 50g alcohol per day is associated with an approximately twofold increase in risk.

The increased risk for oesophageal cancer was consistently observed for a range of different types of alcoholic beverage. However, the association, if any, is weak for adenocarcinoma of the oesophagus. (IARC).

A strong association exists between alcohol use and cancers of the oesophagus, pharynx, and mouth, with links to alcohol as a cause of liver, breast, and colorectal cancers.

Oesophageal cancer is associated with a number of risk factors:

- Alcoholic beverages (and acetaldehyde associated with their consumption)
- Betel quid (with and without tobacco)
- Smokeless tobacco
- Tobacco smoking
- X-radiation, gamma-radiation
- Obesity

Asombang, A.W., Chishinga, N., Nkhoma, A., Chipaila, J., Nsokolo, B., Manda-Mapalo, M., Montiero, J.F.G., Banda, L., Dua, K.S. 2019.

BACKGROUND: Esophageal cancer (EC) is associated with a poor prognosis, particularly so in Africa where an alarmingly high mortality to incidence ratio prevails for this disease.

AIM: To provide further understanding of EC in the context of the unique cultural and genetic diversity, and socio-economic challenges faced on the African continent.

METHODS: We performed a systematic review of studies from Africa to obtain data on epidemiology, risk factors, management and outcomes of EC. A non-systematic review was used to obtain incidence data from the International Agency for Research on Cancer, and the Cancer in Sub-Saharan reports. We searched EMBASE, PubMed, Web of Science, and Cochrane Central from inception to March 2019 and reviewed the list of articles retrieved. Random effects meta-analyses were used to assess heterogeneity between studies and to obtain odds ratio (OR) of the associations between EC and risk factors; and incidence rate ratios for EC between sexes with their respective 95% confidence intervals (CI).

RESULTS: The incidence of EC is higher in males than females, except in North Africa where it is similar for both sexes. The highest age-standardized rate is from Malawi (30.3 and 19.4 cases/year/100000 population for males and females, respectively) followed by Kenya (28.7 cases/year/100000 population for both sexes). The incidence of EC rises sharply after the age of 40 years and reaches a peak at 75 years old. Meta-analysis shows a strong association with tobacco (OR 3.15, 95%CI: 2.83-3.50). There was significant heterogeneity between studies on alcohol consumption (OR 2.28, 95%CI: 1.94-2.65) and on low socioeconomic status (OR 139, 95%CI: 1.25-1.54) as risk factors, but these could also contribute to increasing the incidence of EC. The best treatment outcomes were with esophagectomy with survival rates of 76.6% at 3 years, and chemo-radiotherapy with an overall combined survival time of 267.50 d.
CONCLUSION: Africa has high incidence and mortality rates of EC, with preventable and non-modifiable risk factors. Men in this setting are at increased risk due to their higher prevalence of tobacco and alcohol consumption. Management requires a multidisciplinary approach, and survival is significantly improved in the setting of esophagectomy and chemoradiation therapy.

Alcohol and Cancer of the Mouth

Although tobacco use has been proven to increase the risk of oral cancer, people who use both alcohol and tobacco are at an especially high risk of contracting the disease. Scientists now believe that these substances synergistically interact, increasing each other's harmful effects.

Rogha, M., Berjis, N., Laievardi, S.M., Alamdaran, M. & Hashemi, S.M. 2019.
BACKGROUND: Tongue cancer is the most common malignancy of the mouth. In recent decades, reported tongue cancer incidence and mortality rates have increased all over the world while survival has not improved that sometimes is related to mutation, especially in gene P53 (such R249, R248 mutations). Hence, this study aimed to identification of R249 mutation in P53 gene of tumor tissue in tongue cancer.
METHODS: In a cross-sectional study, 48 patients with squamous cell carcinoma (SCC) of tongue were selected, and mutation of R249 was investigated in sample of tumors. In addition, demographic data and medical history of patients were determined and registered in a collected data form. Finally added data were entered to computer and analyzed by SPSS software.
RESULTS: Polymerase-chain reaction test done on tissue samples from cancer patients showed that in a studied sample of 48 patients, 4 of them (8.3%) had R249 mutation. After selecting the codon 249 as a hotspot in oral cancer, forward and reverse primers for amplification of exon 7 were obtained from the articles.
CONCLUSIONS: Considering the findings of our study, R249 mutation in P53 gene in patients with SCC is relatively high. Age and alcohol consumption were factors affecting incidence of the mutation. It is necessary to take an early treatment with a single lesion of tongue to prevent severe disease and prevent disease in patient's family with screening test and prevent cancer in future with gene therapy.

Alcohol and Cancer of the Liver

Studies provide firm evidence that the consumption of alcoholic beverages is an independent risk factor for primary liver cancer. Various types of alcoholic beverage consumed do not have substantially different effects on liver cancer.
(IARC).

Primary liver cancer (hepatocellular carcinoma) tends to occur in livers damaged by birth defects, alcohol abuse, or chronic infection with diseases such as hepatitis B and C, haemochromatosis (a hereditary disease associated with too much iron in the liver), and cirrhosis.

More than half of all people diagnosed with primary liver cancer have cirrhosis - a scarring condition of the liver commonly caused by alcohol abuse. Hepatitis B and C and haemochromatosis can cause permanent damage and liver failure. Liver cancer may also be linked to obesity and fatty liver disease.

Alcohol and Breast Cancer

More than 100 epidemiological studies conducted in all regions of the world have evaluated the association between the consumption of alcoholic beverages and female breast cancer, and have consistently found an increased risk with increasing intake.

The effects of duration or cessation of consumption of alcoholic beverages on the risk for breast cancer are uncertain.
(IARC).

Each increment in one drink per day was associated with 10% increased risk of Androgen Receptor-positive and Oestrogen Receptor-positive breast cancer, respectively. (Wang, *et al*., 2015).

Research consistently shows that drinking alcoholic beverages - beer, wine, and spirits - increases a woman's risk of hormone-receptor-positive breast cancer. Alcohol can increase levels of oestrogen and other hormones associated with hormone-receptor-positive breast cancer. Alcohol also may increase breast cancer risk by damaging DNA in cells.

Compared to women who do not drink alcohol at all, women who have three alcoholic drinks per week have a 15% higher risk of breast cancer. Experts estimate that the risk of breast cancer goes up another 10% for each additional drink women regularly have each day.

Teen and tween girls aged 9 to 15 who drink three to five drinks a week have three times the risk of developing benign breast lumps. Certain categories of non-cancerous breast lumps are associated with a higher risk of breast cancer later in life.

While only a few studies have been done on drinking alcohol and the risk of recurrence, a 2009 study found that drinking even a few alcoholic beverages per week (three to four drinks) increased the risk of breast cancer coming back in women who had been diagnosed with early-stage disease.

The bottom line is that regularly drinking alcohol can harm one’s health, even if one does not binge drink or get drunk. All types of alcohol count.

Li, H., Terry, M.B., Antoniou, A.C., Phillips, K.A., Kast, K., Mooij, T.M., Engel, C., Noguès, C., Stoppa-Lyonnet, D., Lasset, C., Berthet, P., Mari, V., Caron, O., GENEPSO study, Barrowdale, D., Frost, D., Brewer, C., Evans, D.G., Izatt, L., Side, L., Walker, L., Tischkowitz, M., Rogers, M.T., Porteous, M.E., Snape, K., EMBRACE study, Meijers-Heijboer, H.E.J., Gille, J.J.P., Blok, M.J., Hoogerbrugge, N.; HEBON Investigators, Daly, M.B., Andrulis, I.L., Buys, S.S., John, E.M., McLachlan, S.A., Friedlander,

M.; kConFab Investigators, Tan, Y.Y., Osorio, A., Caldes, T., Jakubowska, A., Simard, J., Singer, C.F., Olah, E., Navratilova, M., Foretova, L., Gerdes, A.M., Roos-Blom, M.J., Arver, B., Olsson, H., Schmutzler, R.K., Hopper, J.L., Milne, R.L., Easton, D.F., Van Leeuwen, F.E., Rookus, M.A., Andrieu, N. & Goldgar, D.E. 2020.

Background: Tobacco smoking and alcohol consumption have been intensively studied in the general population to assess their effects on the risk of breast cancer, but very few studies have examined these effects in *BRCA1* and *BRCA2* mutation carriers. Given the high breast cancer risk for mutation carriers and the importance of *BRCA1* and *BRCA2* in DNA repair, better evidence on the associations of these lifestyle factors with breast cancer risk is essential.

Methods: Using a large international pooled cohort of *BRCA1* and *BRCA2* mutation carriers, we conducted retrospective (5,707 *BRCA1* mutation carriers and 3,525 *BRCA2* mutation carriers) and prospective (2,276 *BRCA1* mutation carriers and 1,610 *BRCA2* mutation carriers) analyses of alcohol and tobacco consumption using Cox proportional hazards models.

Results: For both *BRCA1* and *BRCA2* mutation carriers, none of the smoking-related variables was associated with breast cancer risk, except smoking for more than 5 years before a first full-term pregnancy (FFTP) when compared with parous women who never smoked. For *BRCA1* mutation carriers, the HR from retrospective analysis (HR_R) was 1.19 [95% confidence interval (CI), 1.02-1.39] and the HR from prospective analysis (HR_P) was 1.36 (95% CI, 0.99-1.87). For *BRCA2* mutation carriers, smoking for more than 5 years before an FFTP showed an association of a similar magnitude, but the confidence limits were wider (HR_R = 1.25; 95% CI, 1.01-1.55 and HR_P = 1.30; 95% CI, 0.83-2.01). For both carrier groups, alcohol consumption was not associated with breast cancer risk.

Conclusions: The finding that smoking during the prereproductive years increases breast cancer risk for mutation carriers warrants further investigation.

Impact: This is the largest prospective study of *BRCA* mutation carriers to assess these important risk factors.

It has been estimated that alcohol drinking increases the risk of breast cancer in women by approximately 7% for each increment of 10g alcohol per day. However, the few studies conducted on breast cancer among men have failed to detect an association with quantitative measures of alcohol drinking, even if the alcohol intake is generally higher in men than in women. On the other hand, increased risks of male breast cancer were inconsistently reported in alcoholics or patients with liver cirrhosis. The researchers investigated the role of alcohol drinking in male breast cancer using data collected in a population-based case-control study on seven rare cancers, conducted in Denmark, France, Germany, Italy, and Sweden.

The cases were 74 histologically verified male breast cancer patients aged 35-70 years. The controls (n = 1 432) were selected from population registers, and frequency-matched to the cases by age group and geographic area. To check for consistency, a separate analysis was conducted using as controls the patients with a rare cancer other than male breast cancer recruited simultaneously in the European study (n = 519 men).

Based on population controls, the risk of developing breast cancer in men increased by 16% (95% CI: 7-26%) per 10g alcohol/day ($p < 0.001$). An odds ratio of 5.89 (95% CI: 2.21-15.69) was observed for alcohol intake greater than 90g per day, as compared with light consumers (< 15g per day). Similar associations were observed when other rare cancer patients were used as controls.

The researchers found that the relative risk of breast cancer in men is comparable to that in women for alcohol intakes below 60g per day. It continues to increase at high consumption levels not usually studied in women.
(Guénel, *et al*., 2004).

Cancer and Pancreatic Cancer
Alcoholic beverages are a known carcinogen. Drinking alcohol has been identified as a cause of pancreatitis which is a risk factor for pancreatic cancer. Therefore, stopping consumption of alcohol can reduce your risk for pancreatitis, and your risk for pancreatic cancer.

Tsai, H.J. & Chang, J.S. 2019.
"Despite the advancement in medical knowledge that has improved the survival rate of many cancers, the survival rate of pancreatic cancer has remained dismal with a five-year survival rate of only 9%. The poor survival of pancreatic cancer emphasizes the urgent need to identify the causes or the risk factors of pancreatic cancer in order to establish effective preventive strategies. This review summarizes the current evidence regarding the environmental (non-genetic, including lifestyle, and clinical factors) risk factors of pancreatic cancer. Based on the current evidence, the established risk factors of pancreatic cancer are cigarette smoking, chronic diabetes, and obesity. Other strong risk factors include low consumption of fruits and vegetables, excess consumption of alcohol, poor oral hygiene, and the lack of allergy history. In the future, more studies are needed to identify additional risk factors of pancreatic cancer, especially the modifiable risk factors that could be included in a public health campaign to educate the public in order to reduce the incidence of pancreatic cancer."

Alcohol and Colorectal Cancer
IARC looked at more than 50 prospective and case–control studies which reported on the association between consumption of alcoholic beverages and the risk for colon, rectal or colorectal cancer. There is no consistent evidence that the association of colorectal cancer with the consumption of alcoholic beverages is modified by gender or by tobacco smoking. The data on the effects of duration and cessation of consumption of alcoholic beverages on the risk for colorectal cancer are inadequate.
(IARC).

Alcohol consumption, amount and type of beverage, and drinking patterns at baseline were considered in examination of the effect of alcohol consumption on the risk of colon cancer. The consumption of one or more alcoholic beverages a day at baseline was associated with approximately a 70% greater risk of colon cancer [relative risk (RR)=1.69; 95% confidence interval (CI)=1.03, 2.79], with a strong positive dose-response relationship (P=0.04). This association appeared to be exclusively related to daily drinking of one or more drinks of liquor (RR=2.48; 95% CI=1.66, 4.53).

Overall, alcohol consumption was significantly associated with increased risk of colon cancer. The most important factor for colon cancer seems to be liquor consumption.
(Su & Arab, 2004).

Choi, Y.J., Myung, S.K. & Lee, J.H. 2018.

PURPOSE: The purpose of this study was to determine whether light alcohol drinking increases the risk of cancer by using a meta-analysis of cohort studies because the newly revised 2015 European Code against Cancer fourth edition on alcohol and cancer was based on critical flaws in the interpretation and citation of the previous meta-analyses.

MATERIALS AND METHODS: PubMed and EMBASE were searched in April, 2016. Two authors independently reviewed and selected cohort studies on the association between very light (≤ 0.5 drink/day), light (≤ 1 drink/day), or moderate drinking (1-2 drinks/day) and the risk of cancer incidence and mortality. A pooled relative riskwith its 95% confidence intervalwas calculated by a random-effects meta-analysis. Main outcome measures were cancer incidence and mortality.

RESULTS: A total of 60 cohort studies from 135 articles were included in the final analysis. Very light drinking or light drinking was not associated with the incidence of most cancers except for female breast cancer in women and male colorectal cancer. Conversely, light drinking was associated with a decreased incidence of both female and male lung cancer significantly and both female and male thyroid cancer marginally significantly. Moderate drinking significantly increased the incidence of male colorectal cancer and female breast cancer,whereas it decreased the incidence of both female and male hematologic malignancy.

CONCLUSION: We found that very light or light alcohol drinking was not associated with the risk of most of the common cancers except for the mild increase in the incidence of breast cancer in women and colorectal cancer in men.

Alcohol and Endometrial Cancer

Results suggest that only alcohol consumption equivalent to 2 or more drinks per day increases risk of endometrial cancer in postmenopausal women. Endometrial cancer is the most common gynaecological cancer in the United States and Europe.

Setiawan, V.W., Monroe, K.R., Goodman, M.T., Kolonel, L.N., Pike, M.C. & Henderson, B.E. 2008.

"The role of alcohol intake in the etiology of endometrial cancer is unclear. We examined the impact of alcohol intake on endometrial cancer risk among 41,574 postmenopausal African-American, Japanese-American, Latina, Native-Hawaiian and White women recruited to the prospective Multiethnic Cohort Study in 1993–1996. During an average of 8.3 years of follow-up, 324 incident invasive endometrial cancer cases were identified among these women. Data on alcohol intake and endometrial cancer risk factors were obtained from the baseline questionnaire. Relative risks (RRs) and 95% confidence intervals (CIs) for endometrial cancer associated with alcohol intake were estimated using log-linear (Cox) proportional hazard models stratified by age, year of recruitment, ethnicity and study center, and adjusted for several confounding factors. Increased alcohol consumption was associated with increased risk (*p* trend = 0.013). Compared to non-drinkers, women consuming ≥2 drinks/day had a multivariate RR of 2.01 (95% CI: 1.30, 3.11). There was no increase in risk associated with <1 drink/day (RR = 1.01; 95% CI: 0.77, 1.33) and 1 to <2 drinks/day (RR = 1.09; 95% CI: 0.62, 1.93). There was no clear effect modification by body mass index, postmenopausal hormone use, parity, oral contraceptive use or smoking status, though our power to detect such interactions was limited. Our results suggest that only alcohol consumption equivalent to 2 or more drinks per day increases risk of endometrial cancer in postmenopausal women."

Alcohol and Prostate Cancer

Compared with non-drinkers, men who consumed at least 7 drinks per week during adolescence (ages 15–19) had 3 times the odds of being diagnosed with clinically significant prostate cancer.

Michael, J., Howard, L.E., Markt, S.C., De Hoedt, A., Baily, C. Mucci, L.A., Freedland, S.J. & Allott, E. 2018.

"Epidemiologic evidence for an association between alcohol and prostate cancer is mixed. Moreover, there is a lack of research investigating early-life alcohol intake as a risk factor for either overall or high-grade prostate cancer. We examined lifetime alcohol intake in association with prostate cancer diagnosis in an equal-access, racially diverse prostate biopsy cohort. Men undergoing prostate biopsy at the Durham Veterans Affairs Medical Center from 2007 to 2018 completed a survey indicating average number of alcoholic beverages consumed per week [categorized as none (ref), 1–6, ≥7] during each decade of life. Multivariable logistic regression was used to test the association between alcohol intake across decades and diagnosis of overall, low-grade [grade group (GG) 1–2] and high-grade prostate cancer (GG 3–5). Of 650 men ages 49–89 who underwent biopsy, 325 were diagnosed with prostate cancer, 238 with low-grade and 88 with high-grade disease. Relative to nondrinkers, men who consumed ≥7 drinks/week at ages 15 to 19 had increased odds of high-grade prostate cancer diagnosis (OR = 3.21, P_{trend} = 0.020), with similar findings for ages 20 to 29, 30 to 39, and 40 to 49. Consistent with these results, men in the upper tertile of cumulative lifetime intake had increased odds of high-grade prostate cancer diagnosis (OR = 3.20, P_{trend} = 0.003). In contrast, current alcohol intake was not associated with prostate cancer. In conclusion, among men undergoing prostate biopsy, heavier alcohol intake earlier in life and higher cumulative lifetime intake were positively associated with high-grade prostate cancer diagnosis, while current intake was unrelated to prostate cancer. Our findings suggest that earlier-life alcohol intake should be explored as a potential risk factor for high-grade prostate cancer."

CANSA's Position on Alcohol:

According to the World Health Organization's International Agency for Research on Cancer (IARC) alcoholic beverages are carcinogenic to humans (Group 1). Acetaldehyde, the breakdown product of alcohol, is also carcinogenic to humans (Group 1).

CANSA supports the evidence that alcohol use is a proven carcinogen (cause of many cancers).

CANSA believes that any level of alcohol consumption increases the risk of developing an alcohol-related cancer.

CANSA further believes that when it comes to cancer, no amount of alcohol consumption is safe. Furthermore, there is sufficient scientific evidence that the level of cancer risk increases in line with the level of alcohol consumption.

CANSA, therefore, advocates against the consumption of alcohol in any form, whether it be beer, wine, or distilled spirits.

Medical Disclaimer

This Fact Sheet is intended to provide general information only and, as such, should not be considered as a substitute for advice, medically or otherwise, covering any specific situation. Users should seek appropriate advice before taking or refraining from taking any action in reliance on any information contained in this Fact Sheet. So far as permissible by law, the Cancer Association of South Africa (CANSA) does not accept any liability to any person (or his/her dependants/ estate/heirs) relating to the use of any information contained in this Fact Sheet.

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