Association between Alcohol Consumption and Smoking to Predisposing Conditions: Health Fair Study in Dominica

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Abstract

Alcohol consumption and cigarette smoking seems to be an accepted social practice in every community. Their consequence poses a rising concern on the health and functionality of young individuals. Besides being identified as potential risk factors for various medical conditions, alcohol intoxication and cigarette smoking have major effects on mental health of individuals including risky health behaviors such as suicide, violence, assault etc. Medical conditions such as asthma, tuberculosis, heart disease, diabetes mellitus, blood pressure, kidney failure, depression and cancer have been known to be prevalent among individuals attending a health fair in Dominica. The aim of this study is to associate the consumption of alcohol and cigarette smoking to the above conditions. A health fair was conducted in April 2016 at All Saints University School of Medicine with 260 individuals in attendance. Using questionnaires, data on various variables such as age, sex, marital status, occupation, past medical history that includes history of asthma, tuberculosis, heart disease, diabetes mellitus, blood pressure, kidney failure, depression, cancer, history of heart linked disorders, family history of heart linked disorders and illicit drug consumption was obtained. These were analyzed alongside the variables of smoking and alcohol consumption.

A total of 129 (53.97%) and 29 (12.13%) admitted to alcohol and smoking respectively. Among these, 38.46% consumed only alcohol, while 0.38% participated only in smoking. 21.88% of individuals that consumed alcohol, also attested to the use of cigarette.

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12.5% of alcohol consumers and 37.93% smokers confirmed the use of illicit drug as well. 30.23% of alcohol consumers and 20.69% of cigarette smokers were positive for the history of predisposing illness. There was higher prevalence seen among conditions such as high blood pressure, diabetes mellitus, asthma, and depression but less (though present) with tuberculosis, kidney failure and cancer. It was also observed that, there was early onset of these habits which may suggest a low socioeconomic standard among residents.

This study shows the necessity to implement appropriate measures in early curbing of these dangerous habits especially among teenagers in the society. This can be accomplished by the joint effort of the government, school administrations, health officials and parents to ensure that these habits are strongly discouraged. Creation of awareness on the consequences of alcohol consumption and cigarette smoking, not only on their health but also as it affects the society as a whole, can be one of the ways this can be accomplished. Also, appropriate age limits for consumption of alcohol should be enforced in every alcohol selling store. Alcohol consumption and cigarette smoking should be strictly prohibited in schools, with the continuous awareness of the consequences being put in place.

*Keywords***:** Smoking; Alcohol; Asthma; Tuberculosis; Heart Disease; Diabetes Mellitus; High Blood Pressure; Kidney Failure; Depression; Psychological Instability; Cancer; Illicit Drug Use; Abuse; Social History; Predisposing Conditions; DALYs; Health Fair; All Saints University School of Medicine; Dominica.

1. Introduction

Alcohol has been shown to be the fifth most important risk factor for mortality and is implicated as the cause for 4% of life years lost due to various diseases [1, 2]. In 2010, it accounted for more than 2.5 million deaths worldwide, and annually 69.4 million of disability-adjusted life years (DALYs) [1, 2].

It is currently implicated in various cancers such as cancers of the liver, breast cancer, and colorectal cancer [3, 4]. Alcohol consumption and cigarette smoking have been identified as risk factors for head and neck cancers such as oral cavity cancer, oro/hypo pharyngeal cancer and laryngeal cancer [5]. Studies have also established a strong association of alcohol with conditions like hepatic steatosis (fatty liver), liver cirrhosis, diabetes, and some cardiovascular disorders [6, 7, 8]. The combined effects of cigarette smoking and alcohol consumption has been shown to be associated with age-related macular degeneration (AMD), which is the leading cause of severe loss of vision among individuals aged 50 years and above in developed countries [9].

In the human body, alcohol is converted to acetaldehyde, which is toxic, by alcohol dehydrogenase (ADH) [10]. Acetaldehyde is then converted to acetic acid by aldehyde dehydrogenase (ALDH) [10]. When treating alcohol addiction using disulfiram, it is ALDH that is inhibited to produce toxic side effects of acetaldehyde [11]. Owing to the fact that ADH activity is lower in women than in men and, together with the lower body water content of women, this accounts for the higher susceptibility of females to the injurious effects of ethanol [10].

The effects of alcohol vary from individual to individual and is dependent on a variety of factors such as sex, metabolic rate, body mass, underlying medical conditions, genetics, and lifestyle. For example, studies have shown that there are polymorphisms in the gene that encode one of the alcohol dehydrogenase isoforms

(ADH1B) [12]. It appears to present with different rates of ethanol metabolism and have a substantially different genotype distribution between Blacks and Whites [12].

Previous studies have shown that the alcohol-metabolizing ADH1B*3 functional polymorphism; found almost exclusively in African populations is associated with a 70 to 80 times higher conversion rate of ethanol to acetaldehyde, decreased alcohol dependence, lesser fetal alcohol syndrome rates [12]. However, Blacks are more likely to have health conditions like, hypertension, type 2 diabetes, chronic kidney disease that are worsened by heavy alcohol drinking. The social and physical environmental contexts for drinking also influence patterns of drinking (e.g. bingeing) and the types of alcohol consumed [12].

Alcohol consumption alongside cigarette smoking has been also implicated in atrial fibrillation, which is the most prevalent cardiac arrhythmia [8]. This is accompanied with an increased risk for stroke, three fold increased risk for heart failure, two times increased risk for dementia and a 40% to 90% increase in mortality [8].

In a study carried out on global statistics on addictive behaviors in 2014, it was observed that, about 2.1 billion people (43%) of adults globally drink alcohol [13]. This however, varies according to regions; from 9.8% in central, southern, and western Asia to 88.2% in western Europe [13].

An approximate number of 257 DALYs per 100,000 populations globally, is as a result of alcohol consumption. The highest prevalence being in northern and eastern Europe, South America, the Caribbean, central and northern America, and western Europe. Alcohol consumption amongst individuals in these countries is seen as early as 15 years of age [13]. The least prevalence for alcohol consumption found in Africa, central, southern and western Asia, and in least developed countries [13]. Globally, about 1 billion people (22.5%) of adults smoke tobacco and the age range for youth populations that participate in its use (both smokeless and smoking) is from 13 to 15 years [13]. The prevalence of tobacco smoking ranges from about 13% in Africa, the Caribbean, central and northern America, to about 29.5% in Oceania. Tobacco smoking is more prevalent in males than in females. It was also observed that an approximate of 11% male deaths and 6% female deaths each year has been attributed to tobacco use [13]. In a study carried out on control of chronic non-communicable diseases (NCDs) in the Caribbean, alcohol consumption and tobacco smoking were indicated as one of the important risk factors for these diseases [14]. Other studies also implicated alcohol use in a number of complications during pregnancy, including poor reproductive outcomes. It is also a cause of various fetal alcohol disorders which are characterized by lifelong physical, behavioral and intellectual disabilities [15].

Effects of alcohol consumption on the brain include disruption of sleep architecture; i.e. it decreases sleep latency, increasing sleep fragmentation, thus creating longer episodes of awakening [16, 17].

Other pathological effects include: fatty liver, hepatic cirrhosis, esophagitis, gastric ulcers, esophageal varices and pancreatitis [6, 10, 18]. Chronic alcohol use damages the intestinal mucosa and leads to alterations in growth of the normal flora of the gut, which includes microbial imbalance and overgrowth [18]. This results in increased permeability of the gut, release of endotoxins and other bacterial products into circulation [18].

Alcohol consumption is implicated as one of the risk factors for various cardiovascular diseases. This includes high blood pressure, myocardial infarction and other diseases like diabetes, cancer, depression and asthma [19]. Cigarette smoking is also identified as one of the major risk factors for morbidity and mortality from cardiovascular diseases [20]. It has also been linked to atherosclerosis and coronary heart disease [20, 21, 22]. Passive smoking, which is involuntary inhalation of smoke from other people's cigarette, cigars or pipes, have been associated with increased risk of death from ischemic heart disease and myocardial infarction [20, 21, 22].

Various studies have also demonstrated the close association of smoking with stroke, occlusive peripheral arterial disease, and hypertension. Cigarette smoking affects the cardiovascular system by increasing the risk of atherosclerosis and other related cardiovascular events [20, 21, 22].

Alcohol consumption and cigarette smoking is common in diverse populations especially amongst young adults, and it's a growing cause of concern globally due to its attributed morbidity and mortality rates [23]. This study attempts to link the consumption of alcohol and cigarette smoking to various predisposing conditions such high blood pressure, diabetes, asthma, depression, cancer, kidney disease to mention a few, in Dominica.

2. Materials and Methods

The research was a cross-sectional study involving data collection using a questionnaire. A health fair was conducted in April 2016 at All Saints University School of Medicine, Dominica. A total of 260 individuals participated. The questionnaire was in a history taking format that assessed variables such as demographic data, chief complaints, and history of present illness, past medical and surgical history, social history (alcohol, smoking and drugs), allergies, sexual and menstrual history and vitals. Past medical history included history of asthma, tuberculosis, heart disease, diabetes mellitus, blood pressure, kidney failure, depression, cancer, history of heart linked disorders and illicit drug use. Vitals in the questionnaire were evaluated by measuring blood pressure reading, random blood glucose and body mass index (BMI).

A health fair was organized with a written and signed consent obtained from the university and also from each patient involved in the study. The various instruments used to measure vitals included: blood pressure monitors both manual and semi-automatic monitors, blood glucose monitors, automated weight and height scale and digital thermometers. After the data was obtained and compiled in Excel, statistical calculations using Stata IC 14 was performed which included tabulations, chi square test and regression analysis. The first tabulation was based on general parameters such as sex, professional job, history of predisposing diseases and family history of predisposing diseases.

The second tabulation analyzed alcohol consumers and cigarette smokers based on different age groups. The third tabulation analyzed alcohol consumption and cigarette smoking with certain predisposing diseases such as asthma, tuberculosis, related heart diseases, diabetes mellitus, high blood pressure, kidney failure, depression and cancer.

A multiple regression analysis was run to predict alcohol consumption and cigarette smoking from the variables identified. Statistical significance was kept constant at $P < 0.05$.

3. Result

Attending participants amounted to 99 (38.08%) males and 161 (61.92%) females, totaling to 260 observations. The mean age group was (41-50) ±1.92. A total of 129 (53.97%) and 29 (12.13%) admitted to alcohol and cigarette usage respectively. Among these 100 (38.46%) consumed only alcohol, 1 (0.38%) participated only in cigarette smoking. 28 (21.88%) of alcohol consumers also attested to cigarette use ($P<0.05$). Further history taking aimed at acquiring association between alcohol drinking and cigarette smoking to certain diseases and other factors (Table 1). Distribution among different age groups was also observed (Table 2). 16 (12.5%) of participants positive for alcohol consumption also confirmed the use of illicit drug ($P<0.05$). 11 (37.93%) smokers also established their participation in illicit drug use. Past medical history of participants was also taken to accurately associate alcohol consumption and cigarette smoking to specific predisposing diseases (Table 3).

Table 1: Summary of alcohol consumers and cigarette smokers based on general parameters

Baseline characteristics	Alcohol consumers n (%)	Cigarette smokers n (%)	p-value (Alcohol intake and Cigarette smoking)
Males	71 (78.89)	23 (25.56)	0.000 and 0.000
Females	58 (38.93)	6 (4.03)	0.000 and 0.000
Sedentary occupation	46 (52.87)	6 (6.82)	0.796 and 0.055
Active occupation	83 (54.61)	23 (15.23)	0.796 and 0.055
Positive history of predisposing conditions	39 (30.23)	6 (20.69)	0.151 and 0.099
Positive family history of predisposing conditions	99 (76.74)	20 (68.93)	0.816 and 0.302

Table 2: Distribution of alcohol consumers and cigarette smokers based on age groups

Age group In years	Alcohol consumers (P=0.013) n (%)	Cigarette smokers (P=0.794) n (%)
0-10	0	0
11-20	14 (66.67)	4 (19.05)
21-30	24 (70.59)	5 (15.71)
31-40	15 (75)	3 (15)
41-50	14 (35)	3 (7.69)
51-60	30 (47.62)	6 (9.52)
61-70	17 (48.57)	6 (17.14)
Above 70	15 (57.69)	2 (7.69)

Table 3: Interaction between social history and certain predisposing diseases

Predisposing conditions	Alcohol consumers n (%)	Cigarette smokers n (%)	p-value (Alcohol intake and Cigarette smoking)
Asthma	7 (46.67)	2 (13.33)	0.557 and 0.883
Tuberculosis	1 (100)	1 (100)	0.355 and **0.007**
Related heart diseases	1 (25)	1 (25)	0.241 and 0.427
Diabetes Mellitus	11 (45.83)	2 (8.33)	0.399 and 0.548
High blood pressure	21 (48.84)	4 (9.30)	0.455 and 0.530
Kidney failure	1 (33.33)	0 (0)	0.470 and 0.517
Depression/psychological instability	4 (100)	1 (25)	0.063 and 0.427
Cancer	1 (33.33)	0 (0)	0.470 and 0.517

A multiple regression was run to associate alcohol consumption with age, keeping sex constant. These variables statistically significantly supported the prediction, $F_{(2, 236)} = 23.80$, $p<0.0001$, $R2 = 0.168$. Both variables added statistically significantly to the prediction, $p < 0.05$. The coefficient showed for every 1 year increase in age, there is a rise in alcohol consumption by 3.6%. Regression analysis also showed that the occurrence of predisposing diseases for cigarette smoking was inversely proportional with the number of smokers, such that there was a decrease by 25.7% for each case of newly diagnosed disease. Further analysis showed that for each smoker identified, chances of such individual to be an illicit drug consumer was 48.7%. Multiple regression analysis to predict cigarette smoking from asthma, tuberculosis, heart related diseases, kidney failure, depression, cancer, diabetes mellitus, high blood pressure and cancer showed $F_{(11,227)} = 6.14$, $p<0.0001$, $R2=0.229$, with only tuberculosis and high blood pressure statistically significant to the prediction, $p<0.05$. Multiple regression analysis between cigarette smoking and age, keeping sex constant indicated that for every 1 year increase in age, there is an increase in cigarette smoking by 1.0%.

4. Discussion

The habit of alcohol consumption and cigarette smoking continues to present as a normal routine with its full integration into the social practice of every community [24, 25]. Although the benefits of smoking may have been outlined [26], the damages elicited are usually incomparable [27]. Survey from 2015, showed that an estimate of 1.1 billion people smoke tobacco, with prevalence among males than females and dominance in Eastern Mediterranean and African region [28]. Studies done among American citizens have shown a prevalence of 40 million tobacco users with about 16 million having smoking-related diseases [25]. Tobacco use studies done among the Caribbean population has shown Dominica with 13.22% prevalence among students and 38.39% lifetime prevalence among males [29]. Alcohol consumption on the other hand still remains one of the most widely abused substance globally with an estimate of 2 billion people [24, 30]. Among these consumers,

76.3 million have diagnosable addiction disorder [30]. Alcohol intake has attributed to over 1.8 million deaths [31]. Among the Caribbean population, lifetime prevalence amounts to 68.90% [29]. Although, studies has illustrated potential benefit of consuming alcohol of 30g/day, the tendency to abuse ingestion still remains a major factor [32]. Among other predisposing conditions, alcohol abuse increases the chances for dyslipidemias, liver cirrhosis, coronary artery disease, alcohol dependence, injuries and hypertension [33]. Other conditions include cancers, fetal alcohol syndrome and diabetes mellitus [34]. Alcohol also tend to worsens course of HIV/AIDS and increases susceptibility to infectious diseases [34]. Thus, alcohol is described as a psychoactive substance belonging to the global top five risk factors for disease, disability and death [35].

Tobacco Smoking on the other hand still remains the number one cause of preventable cause of death with an estimate to kill 5.4 million people/year [36]. Smoking tobacco possess the ability to cause increased platelet activation, endothelial damage, chronic obstructive pulmonary disease (COPD), cardiovascular disease, high blood pressure, infertility for both men and women and lung cancer [37]. Tobacco contains nicotine as its psychoactive compound making it extremely hard for individuals to quit the act of smoking [36]. Among other habit and social behavior associated with diseases is illicit drug use. Survey done in 2011 identified about 167 to 315 million people worldwide associated with illicit drug use [38]. Illicit drug use predispose individuals to infective endocarditis (damage of tricuspid valves), mental illness, self-inflicted injuries, suicide, overdose complications, low birth weight and malnutrition [38]. With the increasing concern for the global rate of alcohol abusers and tobacco users [39], this study tends to provide solution to the little knowledge on the prevalence of predisposing diseases in the Caribbean with Dominica as a focus. The dominance of alcohol consumption and tobacco smokers were among males (Table 1). This could either suggest males are more consumers or the fact that males are more likely to report valid social history than females [40]. Although choice of occupation did not influence drinking habit in this study, tobacco smoking supported previous research by proving manual laborers (active occupation) tend to smoke more, however reasons to this is not fully known [41]. This study illustrated the possibility of family members being the main link of initiation to alcohol drinking and tobacco smoking as shown in Table 1 [40]. The early onset of alcohol drinking among the population may indicate early onset of predisposing diseases thus increasing DALYs leading to early deaths. Based on past medical history of various diseases, the prevalence of high blood pressure and diabetes mellitus dominated among alcohol consumers while high blood pressure alone was observed among tobacco smokers. Although there is no evidence to prove that alcohol causes diabetes mellitus, it is usually accepted that diabetics should use caution when consuming alcohol [42]. Alcohol has been advised to well-fed diabetics as it tends to reduce blood sugar, which could also be a probability why some of the diabetics in this study attested to alcohol consumption [42, 43, 44]. It is speculated that alcohol may have a direct effect on blood pressure by either stimulating sympathetic nervous pathway; or stimulating endothelin release, activating renin-angiotensin-aldosterone system, initiating insulin (or insulin resistance); or stimulating more cortisol [45]. Smoking which contains nicotine is a potent vasoconstrictor, thus explaining why most tobacco smokers testified to high blood pressure [37].

5. Conclusion

This study sheds more light on the current trend of alcohol use and tobacco smoking among individuals in Dominica. With predominance on alcohol consumption, this study shows that the Dominican population may be

more susceptible to alcohol-linked diseases. Thus this study suggests further investigation in alcohol drinking habits of indigenes, with a focus on CAGE profile, quantity of intake and the flavor of alcoholic beverages. Further research could involve examination of vital signs and organ systems. The early onset of these habits may suggest a low socioeconomic standard among residents. However, necessary measures are still needed to control alcohol and tobacco usage among teenagers. Measures could involve parental advice by school administration via the parent teachers association (PTA). Implementation of health policy in schools could be put in place as a way of preventing alcohol consumption and tobacco smoking in and out of school premises. Awareness outreaches could also be made to inform the public on the health conditions associated with alcohol and tobacco addiction. The government could also assist by actively curbing stores that sell alcoholic beverages to individuals under the age limit. Health centers and facilities could prescribe drugs such as disulfiram to alcohol addictive patients after proper patient awareness through education.

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