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Is Alcohol Use Related to Obesity in Middle Aged Males in the General Population?

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Abstract

Purpose: Alcohol misuse is a serious public health issue with conflicting findings relating it to obesity. The purpose of this study was to assess whether alcohol use differs by obesity status in middle aged males in the general population.

Methods: This cross sectional analysis used 2016 Behavioral Risk Factor Surveillance System (BRFSS) data for males ages 45 to 64 from Maine (N=1,667), North Dakota (N=1,060), South Carolina (N=1,669), and Wisconsin (N=998). Multiple logistic regression analyses conducted by state were utilized to examine the relationship between alcohol use and obesity while controlling for tobacco use, number of health conditions, mental health, physical activity, education level, employment status, income level, and ethnicity.

Results: Across states, about one third of the sample was obese (35%-38%) and about half to two thirds reported alcohol use (55%-69%). Adjusted results indicated that excessive alcohol use was inversely related to weight status. In addition, having multiple health conditions was positively related to weight status while physical activity and tobacco use were inversely related to weight status.

Conclusion: The results indicated that obesity differed by alcohol use in 45 to 64 year old males in that excessive alcohol use was related to non-obesity. In primary care settings, about one third of middle-aged males may be obese and up to two-thirds may consume alcohol; however, these should be assessed and treated separately. For those with excessive alcohol use, practitioners should evaluate adequate nutrition. In addition, number of health conditions, tobacco use, and physical activity were significantly related to obesity. Therefore, clinicians should screen for all if middle aged males present with any, coordinate treatment of multiple conditions, and educate patients on the benefits of exercise and smoking cessation.

Keywords: Obesity; Alcohol use; Weight status; Middle aged males; Health conditions

Introduction

Obesity is caused by the accumulation of a substantial amount of body fat, leading to a BMI level of more than 30 kg/m^2, which consequently harms a person's health [1-4]. Approximately one-third of adults in the United States are obese, which is about 72 million individuals, with a higher incidence among middle aged adults [1,5-7]. As obesity rates increase, the risk for medical conditions such as type II diabetes, heart disease, hypertension, stroke, cancer, and musculoskeletal problems also increase [1,2,5,8]. Healthcare related to obesity results in a large financial burden both nationally and individually with annual costs approximating $147 billion and $1429 in medical bills, respectively [1,2].

Research shows that obesity is related to health behaviors and demographic factors. For example, consuming excess calories, sodas, fast foods, snacks, and increased portions all contribute to weight gain [1,4,9]. In addition, physical inactivity is known to be positively related to obesity [2,9], whereas smoking is inversely related [10,11]. Although obesity is a health risk for all populations, it has been found that men with higher incomes and women with lower incomes are at higher risk for obesity [5]. Obesity also differs by ethnicity/race and education, as Native Americans, Pacific Islanders, Non-Hispanic Blacks, and Mexican Americans as well as individuals with lower levels of education have a higher overweight/obesity prevalence [4].

In addition to obesity, alcohol misuse is a serious public health issue. Increased alcohol intake is the third leading cause of death in the United States [12] with the prevalence of alcohol abuse being approximately 13% [13]. Alcohol consumption has been linked to a higher probability of violence, injury, suicide, and unintentional death [14]. In addition, excess alcohol consumption causes an increased risk for diseases such as cardiovascular disease, hypertension, cirrhosis, cancers, substance abuse disorders, and mental health problems including depression and anxiety [14,15]. Furthermore, higher daily consumption of alcohol can result in increased alcohol dependence, hospitalizations, and alcohol related deaths from motor vehicle accidents or suicides [16,17].

Research links obesity and alcohol misuse, but findings are conflicting [7,12,13,16,18]. While there is not a significant relationship between light drinking and obesity in adults, the relationship between heavy drinking and obesity in adults is significant [10]. Individuals who drink excessive amounts of alcohol (greater than 60 g/day for men and greater than 30 g/day for women) have a higher likelihood of being obese [10]. Binge drinking has also been related to increased obesity rates [19]. However, other studies have shown no relationship and even inverse associations between obesity and alcohol consumption among adult males [16]. Since research indicates increased alcohol consumption among males compared to females, higher incidence of obesity among middle-aged adults, and conflicting findings for relations with obesity, the purpose of our study is to assess the association between obesity and alcohol consumption among middle aged males in the general population.

Methods

Design

This cross-sectional analysis uses data from the 2016 Behavioral Risk Factor Surveillance System (BRFSS) conducted by the Centers for Disease Control and Prevention (CDC) [20]. BRFSS obtains information about health risk behaviors, medical conditions, and the use of preventative measures against disease through the use of annual telephone surveys using random-digit dial techniques in all fifty states, the District of Columbia, and three U.S. territories. The CDC compiles all BRFSS data and makes de-identified data available to researchers for secondary data analysis. This study was given exempt status by Institutional Review Board of The University of North Texas Health Science Center.

Sample

The samples included males ages 45 to 64 in Maine (N=1,667), North Dakota (N=1,060), South Carolina (N=1,669), and Wisconsin (N=988). These states were selected for their higher proportions of obesity and alcohol use in males across the United States [21].

Data

The outcome, obesity, was originally measured in BRFSS as “underweight”, “normal”, “overweight” or “obese.” We recoded this variable into two categories; “obese” versus “not obese” to better fit our outcome of choice. The factor of interest, alcohol consumption, was originally measured in BRFSS as average number of drinks per day. We then categorized amounts as “none”; “light” (defined as less than one drink per day); “moderate” (defined as 1-4 drinks per day for males); and “excessive” (defined as five or more drinks per day for males) [22].

The control variables included tobacco use, health conditions, mental health status, physical activity, education level, employment status, income, and ethnicity/race. Tobacco use was measured in BRFSS as yes/no to being a current smoker. Health conditions was determined as number of diagnoses for the following health conditions: heart attack, coronary heart disease (CHD), stroke, skin cancer, cancer, chronic obstructive pulmonary disease (COPD), arthritis, depression, kidney disease, diabetes, or asthma. This number was then categorized as “0 health conditions”, “1 health condition”, “2 health conditions”, or “3 or more health conditions.”

Mental health status was measured as yes/no for 30 days of good mental health in the last 30 days. Physical activity was dichotomized as yes/no for “performed physical activity or exercise” within the past 30 days. Education level was also dichotomized as yes/no for “graduated college/technical school.” Employment status was categorized as “employed” or “not employed.” Income was categorized as “$0 to less than $25,000,” “$25,000 to less than $50,000,” and “$50,000 or more.” Ethnicity had multiple categories but because of small numbers of non-white participants in our samples, race/ethnicity was categorized as “White, non-Hispanic” versus “other.”

Analysis

Frequency distributions were assessed by state to determine sample characteristics and possible issues with variable distributions. Multiple logistic regression analysis conducted by state was used to assess the relationship between alcohol use and obesity after controlling for tobacco use, number of health conditions, mental health status, physical activity, education level, employment status, income, and ethnicity/race.

Adjusted analyses were conducted separately by state to identify patterns in variable relations across similar samples. Similar results in three or four of four states were considered reliable evidence for variable relations. Any observations with missing data for any variables were excluded from the adjusted analysis. **Table 1** shows sample characteristics while **Table 2** reports multivariable analysis results. All analysis was conducted in STATA 15 (version 15.1, Copyright 1985-2017 StataCorp LLC).

Table 1: Participant characteristics by state.

Variable	Maine (N=1,667)		North Dakota (N=1,060)		South Carolina (N=1,669)		Wisconsin (N=988)	
	n	%	n	%	n	%	n	%
Weight Status	1,635	98	1,020	96	1,627	97	945	96

Obese	566	35	389	38	608	37	343	36
Not Obese	1,069	65	631	62	1,019	63	602	64
Alcohol Use	1,618	97	1,025	97	1,626	97	955	97
None	553	34	314	31	730	45	291	30
Light	214	13	164	16	176	11	137	14
Moderate	353	22	283	28	295	18	247	26
Excessive	498	31	264	26	425	26	280	29
Tobacco Use	1,635	98	1,022	96	1,609	96	940	95
Current Smoker	310	19	218	21	354	22	175	19
Nonsmoker	1,325	81	804	79	1,255	78	765	81
Health Conditions	1,630	98	1,039	98	1,601	96	961	97
0	675	41	499	48	628	39	451	47
1	492	30	294	28	475	30	255	27
2	255	16	149	14	250	16	124	13
3 or more	208	13	97	9	248	16	131	14
Mental Health Status	1,667	100	1,060	100	1,669	100	988	100
Good in the past 30 days	1,194	72	819	77	1,198	72	716	72
Not good in the past 30 days	473	28	241	23	471	28	272	28
Physical Activity	1,665	100	1,059	100	1,667	100	987	100
Performed in the past 30 days	1,352	81	780	74	1,226	74	790	80
Did not perform in the past 30 days	313	19	279	26	441	26	197	20
Education Level	1,665	100	1,060	100	1,666	100	987	100
Graduated college/technical school	578	35	321	30	521	31	314	32
Did not	1,087	65	739	70	1,145	69	673	68
Employment Status	1,656	99	1,057	100	1,665	100	969	98
Employed	1,716	71	856	81	1,103	66	706	73
Not Employed	480	29	201	19	562	34	263	27
Income Level	1,567	94	974	92	1,479	89	866	88
$0 to less than $25,000	359	23	119	12	361	24	156	18
$25,000 to less than $50,000	337	22	197	20	351	24	198	23
$50,000 or more	871	56	658	68	767	52	515	59
Ethnicity/Race	1,632	98	1,040	98	1,608	96	968	98
White, non-Hispanic	1,554	95	969	93	1,076	67	844	87
Other	78	5	71	7	532	33	124	13

Results

Descriptive statistics for participant characteristics

Table 1 shows sample characteristics for middle aged male's ages 45 to 64 years in Maine, North Dakota, South Carolina, and Wisconsin. Across the four states, about one-third of the samples were obese (35%-38%) and about half to two-thirds reported light (11%-16%), moderate (18%-28%), or excessive (26%-31%) alcohol use. For health behaviors, the majority reported not smoking (78%-81%), while approximately one-fourth reported no physical activity or exercise in the past 30 days (19%-26%). In addition, about half reported having one (27%-30%), two (13%-16%), or three or more (9%-16%) health conditions, and approximately three fourths (72%-77%) reported good mental health in the past 30 days. For socioeconomic

status, about one-third graduated from college or technical school (30%-35%), and the majority of participants reported current employment (66%-81%) and making $50,000 or more (52%-68%). Most participants were White, non-Hispanic (67%-95%)

Adjusted Statistics for relations among variables

As shown in **Table 2**, the results of multiple logistic regression analysis for middle aged males in Maine, North Dakota, South Carolina, and Wisconsin indicated that after controlling for all other variables in the model, weight status was consistently related to alcohol use. Across three of four states, participants who reported excessive alcohol use were about 2 times less likely to be obese compared to those who did not consume alcohol. In addition, across all four states, those who were current smokers were about 2 times less likely to be obese than those who were not current smokers.

Table 2: Adjusted results by state.

Predicting Weight Status (obese *vs* not obese)	Maine			North Dakota			South Carolina			Wisconsin		
	AOR	95% CI		AOR	95% CI		AOR	95% CI		AOR	95% CI	
		Low	High		Low	High		Low	High		Low	High
Alcohol Use												
None	ref	-	-	ref	-	-	ref	-	-	ref	-	-
Light	0.9	0.63	1.28	1.62	1.06	2.48	1.24	0.86	1.79	1.43	0.9	2.3
Moderate	0.68	0.5	0.93	1.68	1.16	2.44	0.57	0.41	0.8	1.02	0.68	1.52
Excessive	0.46	0.34	0.63	0.86	0.57	1.29	0.55	0.4	0.75	0.57	0.37	0.88
Tobacco Use												
Current Smoker	0.52	0.37	0.72	0.53	0.37	0.77	0.55	0.4	0.75	0.45	0.29	0.71
Health Conditions												
0	ref	-	-	ref	-	-	ref	-	-	ref	-	-
1	1.61	1.22	2.13	1.32	0.94	1.85	1.57	1.17	2.1	1.41	0.96	2.06
2	1.72	1.21	2.44	2.09	1.38	3.17	2.05	1.43	2.93	2.67	1.65	4.32
3 or more	2.88	1.9	4.35	2.08	1.25	3.46	2.13	1.46	3.12	2.45	1.44	4.18
Mental Health Status												
Good mental health in the past 30 days	1.07	0.82	1.41	1.28	0.91	1.81	0.81	0.62	1.07	1.34	0.92	1.95
Physical Activity												
Performed in the past 30 days	0.66	0.49	0.89	0.65	0.47	0.91	0.84	0.63	1.11	0.64	0.43	0.95
Education Level												
Graduated college/technical school	0.53	0.41	0.69	0.57	0.41	0.79	0.65	0.49	0.87	0.71	0.5	1
Employment Status												
Employed	1.12	0.82	1.54	0.66	0.44	0.97	1.36	1	1.86	0.68	0.45	1.02
Income Level												
$0 to less than $25,000	ref	-	-	ref	-	-	ref	-	-	ref	-	-
$25,000 to less than $50,000	0.91	0.63	1.32	1.3	0.76	2.22	1.27	0.88	1.85	0.85	0.5	1.43
$50,000 or more	1.12	0.78	1.59	1.35	0.81	2.24	1.11	0.76	1.64	1.54	0.92	2.56
Ethnicity/Race												
White, non-Hispanic	2.28	1.23	4.21	1.02	0.57	1.82	0.81	0.62	1.05	1.37	0.82	2.3

Note: AOR=adjusted odds ratio; 95% CI=95% confidence intervals; ref=referent group; boldface indicates significance (AORs with 95% CI that do not include 1.00 are significant)

Furthermore, when compared to those who reported no health problems, those who reported 2 health conditions were about 2 to 2.5 times more likely to report obese status, whereas those who reported 3 or more health conditions were about 2 to 3 times more likely to report obese status. In contrast, participants who performed physical activity in three of four states in the past 30 days were about 1.5 times less likely to be obese than those who did not perform physical activity in the past 30 days.

Discussion

The purpose of this study was to assess whether alcohol use differed by obesity status in middle-aged males in the general population. The results of adjusted analyses indicated that weight status was significantly but inversely related to alcohol use across states. Males ages 45 to 64 who reported excessive drinking were about 2 times less likely to be obese, findings similar to prior research that found inverse relations [11,16], but dissimilar to others that found positive relations [10,13,16,18] between obesity and alcohol use. Differing results across studies may be due to varying methods used in measuring alcohol use such as the number of alcoholic drinks, percentage of energy intake per drink, and the concentration of alcohol in the beverage. There were also discrepancies in target populations across studies including general and medical populations from Europe, Asia, or North America as well as including both genders and all ages, whereas this study focused on middle-aged males from the general population.

This study also found that those who use tobacco are less likely to be obese, similar to prior research findings [1,2,8,10,18,23]. The findings for alcohol and tobacco use as related to reduced weight status in this study are concerning. Not only is substance use related to poorer health outcomes, especially over time, but the results of this study may suggest that substance users may not have healthy eating habits [3] given that alcohol intake should increase calorie counts and amount consumed [18,19]. Poor nutrition in addition to substance use would also make poorer health outcomes more likely. In addition, food and substance use may trigger similar pleasure receptors in the brain [7] so over indulgence may only happen in one area.

In addition, obesity in middle-aged males was consistently related to reported number of health conditions and physical activity [1,2,8,10,18,23]. Those reporting two or more health conditions were about 2 to 3 times more likely to be obese, whereas those who reported physical activity in were about 1.5 times less likely to be obese. These results may suggest that the management of health and health conditions are important for weight status in middle-aged males.

Limitations

BRFSS 2016 data includes a large number of respondents, allowing us to assess variable relations within a specific gender and age group. However, participants did not specify what type of alcoholic drinks were consumed, which may impact results because alcohol beverages come in varying amounts of ethanol and caloric content. In addition, there was no information on whether the amount of alcohol use reported represented a long term habit or simply recent use. Moreover, type of diet, nutrition, and calorie intake are major factors that play a role in weight status; however, data was unavailable for these. Future studies may want to focus on eating habits as related to weight status and alcohol use in middle-aged males. In addition, although number of health conditions was related to obesity in this study, we had no information for health condition management or medication use. This may impact results as varying interactions and effects on drug metabolism in combination with alcohol can affect weight status.

Conclusion

Because this was a population-based study, results may be generalizable to 45- to 64-year-old males in primary care. Providers may expect that up to one-third of middle-aged males may be obese or excessive alcohol users. Because excessive alcohol use was inversely related to obesity, practitioners should continue to screen middle-aged males for both obesity and alcohol as symptoms present, but treat separately. For obesity, providers should educate patients about the benefits of proper exercise and diet and provide referrals to specialists for obesity issues. For excessive alcohol use, providers should further screen patients for adequate nutrition and make referrals to addiction specialists. In addition, providers may expect that up to one-third of their male patients ages 45 to 64 have two or more health conditions (23%-32%) and this may be moderately related to obesity. Thus, practitioners should coordinate treatment for comorbid health conditions, assess patient management and compliance, and educate patients about the importance of drug compliance, co-management of multiple health conditions, and having regular follow up appointments to assess progress. Finally, up to one-fourth of middle-aged male patients may use tobacco and report physical inactivity and these are moderately related to obesity. Thus, providers should educate males ages 45 to 64 on the importance of smoking cessation and physical activity and discuss options that would fit into patients' lifestyles.

Disclaimers

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