Assessing the Association between Body Mass Index, Cholesterol and Cancer among United States Adults in the Medical Expenditure Panel Survey using a Cross-Sectional Design

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Background

- Cancer is the second leading cause of death in the United States (US) and the number of cancer cases is increasing. [1-2]
- More than 70% of the US population is overweight or obese and around 10% has high total blood cholesterol. [3-4]

Objective

- The study objective was to assess the relationship of cholesterol and Body Mass Index (BMI) with any diagnosis of cancer among US adults.

Methods

- This was a retrospective cross-sectional study using 2020 Medical Expenditures Panel Survey (MEPS) data.[5]
- To be eligible for this study, participants had to be aged ≥18 years, have data available in the dataset for any cancer diagnosis, BMI, and cholesterol, and be alive during the entire data collection period.
- Chi-square tests were used to compare the cancer diagnosis and no cancer diagnosis groups.
- The relationship of cholesterol and BMI combinations with any cancer diagnosis was assessed by a multivariate logistic regression model, adjusting for several demographic variables.
- The MEPS complex survey design was taken into account during analyses to produce national estimates.

Results

- Among 27,805 individuals in the 2020 MEPS data, 20,818 met the eligibility criteria (weighted N=252,340,615).
- Any Cancer Diagnosis: N=2,668 (weighted N=29,770,359).
- No Cancer Diagnosis: N=18,150 (weighted N=222,570,256).

Factors	Cancer Diagnosed % (95% confidence interval)	Cancer Not Diagnosed % (95% confidence interval)	p value
Independent			
Obese; High Cholesterol	20.0 (17.9, 22.0)	13.9 (13.1, 14.7)	<0.0001
Overweight; High Cholesterol	19.9 (17.9, 21.9)	11.1 (10.3, 11.8)	
Underweight; High Cholesterol	1.1 (0.5, 1.6)	0.4 (0.2, 0.5)	
Normal weight; High Cholesterol	14.9 (13.0, 16.8)	7.3 (6.7, 8.0)	
Obese; Normal Cholesterol	11.4 (9.8, 13.0)	20.3 (19.1, 21.4)	
Overweight; Normal Cholesterol	14.2 (12.3, 16.0)	21.4 (20.4, 22.4)	
Underweight; Normal Cholesterol	1.2 (0.7, 1.8)	1.5 (1.2, 1.8)	
Normal weight; Normal Cholesterol	17.3 (15.4, 19.2)	24.1 (22.9, 25.4)	
Gender			
Male	42.7 (40.4, 44.9)	49.1 (48.5, 49.8)	<0.0001
Female	57.3 (55.1, 59.6)	50.9 (50.2, 51.5)	
Age			
<30	2.0 (1.3, 2.6)	22.7 (21.8, 23.7)	<0.0001
≥30	98.0 (97.4, 98.7)	77.3 (76.3, 78.2)	
Race			
White	89.6 (88.2, 91.1)	76.1 (74.4, 77.8)	<0.0001
Black	6.6 (5.5, 7.8)	13.2 (12.0, 14.4)	
Asian / Native Hawaiian / Pacific Islands	2.1 (1.4, 2.8)	7.1 (6.0, 8.2)	
Other	1.6 (1.1, 2.1)	3.6 (3.1, 4.1)	
Etnicity			
Hispanic	6.8 (5.6, 8.1)	18.2 (16.3, 20.1)	<0.0001
Not Hispanic	93.2 (91.9, 94.4)	81.8 (79.9, 83.7)	
Education			
Up to 12 years	33.1 (30.8, 35.5)	40.5 (39.0, 42.1)	<0.0001
Over 12 years	66.9 (64.5, 69.2)	59.5 (57.9, 61.0)	
Employment Status			
Employed	41.0 (38.6, 43.3)	69.2 (68.1, 70.2)	<0.0001
Unemployed	59.0 (56.7, 61.4)	30.8 (29.8, 31.9)	
Martial Status			
Married	59.0 (56.8, 61.3)	50.6 (49.5, 51.8)	<0.0001
Other	41.0 (38.7, 43.2)	49.4 (48.2, 50.5)	
Alcohol Consumption			
None	37.1 (34.1, 40.1)	37.6 (36.0, 39.2)	<0.0001
Up to 1 drink / week	36.6 (33.6, 39.6)	42.2 (41.1, 43.4)	
Over 1 drink / week	26.3 (23.6, 29.0)	20.1 (18.9, 21.3)	
Smoking Status			
Yes	10.3 (9.0, 11.7)	12.6 (11.8, 13.3)	0.0057
No	89.7 (88.3, 91.0)	87.4 (86.7, 88.2)	
Diabetes			
Yes	19.4 (17.6, 21.2)	10.6 (10.0, 11.1)	<0.0001
No	80.6 (78.8, 82.4)	89.4 (88.9, 90.0)	
Cardiovascular Disease			
Yes	64.6 (62.2, 67.1)	34.3 (33.4, 35.3)	<0.0001
No	35.4 (32.9, 37.8)	65.7 (64.7, 66.6)	

Results Continued

Table 2. Unadjusted and Adjusted Odds Ratio's for Body Mass Index (BMI) and Cholesterol Combinations with Cancer Diagnosis Status among United States Adults

Factors	Unadjusted Odds Ratio (95% Confidence Interval)	Adjusted Odds Ratio (95% Confidence Interval)
Obese & High Cholesterol vs Ref	1.999 (1.676-2.384)	0.917 (0.734-1.145)
Overweight & High Cholesterol vs Ref	2.506 (2.107-2.980)	1.159 (0.933-1.440)
Underweight & High Cholesterol vs Ref	4.043 (2.243-7.290)	**2.002 (1.032-3.885)**
Normal Weight & High Cholesterol vs Ref	2.834 (2.310-3.477)	**1.326 (1.047-1.681)**
Obese & Normal Cholesterol vs Ref	0.787 (0.647-0.957)	**0.681 (0.543-0.853)**
Overweight & Normal Cholesterol vs Ref	0.922 (0.757-1.122)	0.862 (0.691-1.074)
Underweight & Normal Cholesterol vs Ref	1.101 (0.637-1.902)	1.052 (0.541-2.045)
Ref=reference group: Normal Weight & Normal Cholesterol		

Conclusions

- Underweight and normal weight US adults with high cholesterol levels were found to be associated with higher odds of having a cancer diagnosis, while obese US adults with normal cholesterol level were found to be associated with lower odds of having a cancer diagnosis.
- Future studies with a prospective design and consideration of site-specific cancers are advised to investigate this topic in greater detail.

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