

Impact of Body Mass Index on Delirious Patients Outcomes: A Nation-Wide Analysis

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Background: Delirium is a common serious health problem characterized by abrupt changes in consciousness and cognitive function. It leads to poor prognosis, especially among older adults. Low body mass index (BMI) is an independent risk factor for intensive care unit and postoperative delirium, though the impact of body mass index on the prognosis of delirium has not been well studied. This study aims to examine the correlation of BMI on outcomes of delirium patients.

Methods: This cross-sectional study utilized national inpatient sample (NIS) database to examine the association of low BMI ($\leq 19 \text{ kg/m}^2$) termed underweight with patient outcomes among patients admitted with delirium diagnosis between January 1, 2020, and December 31, 2020. This study included adult patients (>18 years old) with delirium as primary and underweight (Z68.1) as secondary diagnosis using International Classification of Diseases (ICD) 10 codes. The study variables included gender, age, race, Charlson Comorbidity Index (CCI), insurance, median household income, hospital region, hospital bed size, teaching hospital status and dementia. We compared baseline characteristics and outcomes for delirium hospitalization. Primary outcome was in-hospital mortality. Hospital length of stay (LOS) and total hospital charges were secondary outcomes. Main determinant variable was BMI status (underweight vs non-underweight). Values were presented as percentages or as mean $\pm$ standard deviations. Recommended discharge and hospital weights were included to construct national estimates for every analysis. Univariate and multivariate regression analyses were used to find odds ratio and adjusted mean differences. Variables with univariate test with a $p < 0.20$ was included in multivariable model, along with other variables of known clinical importance. STATA version 18.0 (StataCorp LLC, Texas, USA) was used for statistics, and $p < 0.05$ was considered statistically significant.

Results: About 130,805 patients were hospitalized with delirium as primary diagnosis with 6,605 (5.05%) being underweight patients. Overall, in-hospital mortality among the delirium hospitalization group was 2.2%. Most underweight delirium patients were females (63.1%), mean age of 74 years, Caucasian (71.04%), with a low median household income (29.4%) and Medicare payer type (81.2%). Hospital characteristics for most of these admissions include large bed size (49.5%), urban teaching hospitals (70.9%) and located in southern part of United States (38.4%). In multivariate regression analysis, underweight delirium patients had statistically significant increased risk of in-hospital mortality (adjusted odds ratio, [AOR] 2.03; $p < 0.001$), higher average LOS (additional 2.28 days; $p < 0.001$) and higher total hospital charges per stay (additional \$10,295.26; $p < 0.003$) when compared to non-underweight patients after controlling for patient and hospital characteristics, CCI and dementia.

Conclusions: Underweight is an independent risk factor for in-hospital mortality, longer LOS, and higher costs among adult delirium patients. This study aims to create awareness about this special subgroup of delirium patients for improving their outcome.