

BODY MASS INDEX AND ITS ASSOCIATION WITH DISC DEGENERATION OF THE LUMBAR SPINE IN ADULTS

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Introduction: Disc degeneration of the lumbar spine is a worldwide concern, often associated with low back pain and debilitating functional status. The true etiology of disc degeneration remains speculative. Elevated body mass index (BMI) has been suggested as a risk factor of disc degeneration, but such an association remains questionable in the literature. Furthermore, the extent and severity of BMI upon disc degeneration remains speculative. As such, we addressed the association of BMI to the presence, extent, and severity of disc degeneration in adults.

Materials and Methods: As part of a population-based study addressing disc degeneration, a cross-sectional analysis was performed of 2,252 individuals of Southern Chinese origin who were 21 years of age or older (range: 21-88 years) having undergone sagittal T2-weighted MRI of the lumbar spine. Disc degeneration was classified according to Schneidermann et al's criteria. The presence and severity of disc herniation as well as additional radiographic findings were assessed. Assessment of exercise activity, previous lumbar injury, smoking, workload, weight, and height were performed. Asian-modified BMI (kg/m²) categories were established (i.e. underweight: <18.5 kg/m², normal: 18.5-23.0 kg/m², overweight: 23.0-27.5 kg/m², obese: >27.5 kg/m²). Uni- and multivariate analyses were performed. Logistic regression analysis with adjustments for age, workload, previous lumbar injury and specified radiographic changes (Schmorl's nodes and Modic changes) was also performed. The threshold for statistical significance was p<0.05.

Results: There were 906 males and 1,346 females, with a mean age of 41.4 years (SD ± 10.1 years). Disc degeneration was noted in 1,598 (71%) subjects. Based on BMI categories, 173 (7.7%) of the subjects were underweight, 1,093 (48.5%) were normal, 780 (34.6%) were overweight, and 206 (9.1 %) were obese. Sex-type was not a significant factor associated between BMI and disc degeneration (p=0.303). BMI was significantly higher in subjects with disc degeneration (mean: 23.3 kg/m²; SD ± 3.8 kg/m²) compared to subjects without disc degeneration (mean: 21.6 kg/m²; SD ± 3.2 kg/m²) (p<0.001). Age- and workload severity-adjusted BMI was positively correlated with overall disc degeneration score (r=0.450, p<0.001), the number of levels of disc degeneration (r=0.365, p<0.001), and the overall disc herniation score (r=0.230, p<0.001). A statistically

significant difference was noted between BMI categories and age-adjusted degenerative disc disease (DDD) score (p=0.003) (**Figure 1**). In the adjusted logistic regression model, there was a positive and significant polynomial dose-response between BMI and disc degeneration (underweight, 1 (Ref); normal, OR: 2.3, 95% CI: 1.57-3.23; overweight, OR: 3.2, 95% CI: 2.20-4.73; obese, OR: 5.3, 95% CI: 3.13-9.05; p<0.001) (**Figure 2**).

Figure 1

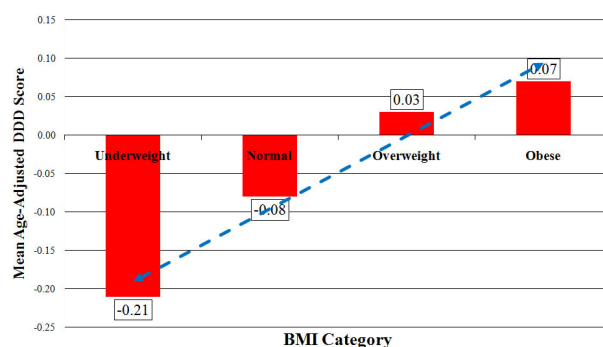
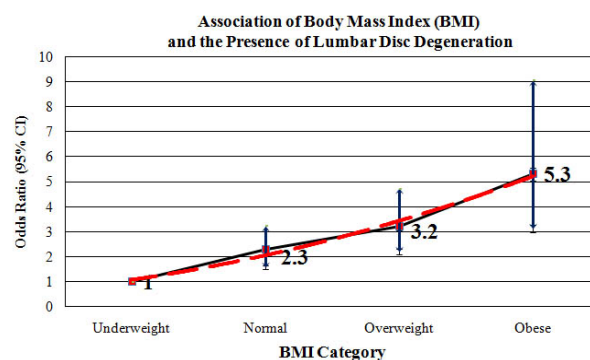


Figure 2



Conclusion: Based on the largest population-based study to systematically assess lumbar disc degeneration, our study noted that BMI is associated with the presence of disc degeneration. To our knowledge, our study is the first to note a significantly increasing dose-response between BMI and disc degeneration of the lumbar spine. Increased extent and severity of disc degeneration was also noted with elevated BMI, in particular overweight and obesity. Future analyses assessing risk factors of disc degeneration should be cognizant of BMI as an influential factor and its effects upon disease.