



Pathology Biology Section – 2007

G6 Weight That Kills: Adults With Natural Deaths are Heavier Than Those Dying Non-Naturally — A Cross-Sectional Study

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After attending this presentation, attendees will understand the impact of obesity on natural death by applying standard epidemiologic techniques to data obtained at the State of Maryland Medical Examiner Office.

This presentation will impact the forensic community and/or humanity by highlighting the problem of obesity and raising awareness of how deep and broad the problem is and the need to address it.

Introduction: The morbidity and mortality produced by obesity in the United States and other developed societies has reached epidemic proportions. Although the problem starts in childhood and adolescence, the medical impact takes hold in adult life. Clinical studies have shown the effect of obesity on cardiovascular disease, diabetes, cancer degenerative joint diseases among others, and some autopsy studies have confirmed the clinical findings.

Aim: To evaluate the magnitude and severity of the impact of obesity on mortality

Hypothesis: Excess weight is a risk factor for mortality; thus Body Mass Index (BMI) in individuals with a natural death is higher than in those with non-natural deaths (they would be alive if not for the non-natural factors).

Methods: Cross-sectional study involving young and middle age adults (ages 20 – 50 years) in the state of Maryland whose death during a recent three year period (2002-2005) was either unexpected or violent.

Cases were selected from the State of Maryland Office of the Chief Medical Examiner (OCME) database. The State of Maryland has a single,

centralized office that covers the entire state. All non-natural deaths and purely natural deaths that are unexpected or unsupervised by a physician, affecting persons under 50 years of age are transported to the office for cause of death investigation.

- Each body was measured and weighed upon arrival at the OCME.
- BMI was calculated following a standard formula (BMI = weight in kilograms/squared height in meters)
- Cases were tabulated by age, gender, manner of death, height, weight, BMI and BMI NIH categories (normal [BMI <25], overweight [25<BMI<30], obese [30<BMI<40] and very obese [BMI<40])
- Non-natural deaths (Accident, Suicide, Homicide and Undetermined) were analyzed separately and grouped together for comparison
- Statistical analysis included descriptive statistics and multivariate logistic regression, using likelihood ratio tests of statistical significance. Effect sizes were estimated by odds ratios (OR)
- Possible bias (systematic errors impacting the different groups differently) were sought and discussed

Results: The study included 6987 individuals, 2097 (30.0%) had natural deaths and 4890 had non-natural [1345 (19.3%) were accidents, 1210 (17.3%) were homicides, 642 (9.2%) were suicides and 1693 (%) undetermined.

- The percentage of women in the natural death group was higher (34.0%) than in the non-natural deaths (21.5%), and the average age (SD) was higher for the group of natural deaths (41.3 +/-7.0) than the group of non-natural deaths (35.1 +/- 9.0).
- BMI was an independent risk factor ($p<0.0001$, OR=9.4) for natural death when adjusted for age ($p<0.0001$, OR=15.4) and gender ($p<0.0001$, OR=1.7 F/M) in a multivariate logistic regression analysis. Per unit of measure, BMI was a comparable risk factor to age.
- The mean (SD) BMI in natural deaths was higher than that of non-natural deaths: 29.3 (9.1) vs. 27.5 (6.5).
- The percent of natural deaths among the different BMI levels was 26.9% for people in the normal weight range, 27.9% in the overweight group, 32.1% in the obese group, and 48.6% among the very obese.

Conclusions: In an adult population, the relative frequency of natural death increases steadily with increasing levels of obesity. This increase persists when adjusted for both age and gender, indicating that obesity is an independent risk factor, comparable or greater in its effect to age.

Obesity, Body Mass Index, Natural Deaths