

Unanticipated Lipid Profiles in Victims of Sudden Unexpected Death: Low Low-density Lipoprotein Cholesterol and an Elevated Triglyceride to High-density Lipoprotein Cholesterol Ratio

Nisha Hosadurg¹; Brittany Bogle²; Golsa Joodi¹; Murrium I Sadaf¹; Philip M Mendys⁴; Ross J Simpson Jr.¹

Author Affiliations:

¹Department of Cardiology, University of North Carolina School of Medicine

Background: Though low-density lipoprotein cholesterol (LDL) is a proven cardiovascular risk factor, substantive data on LDL levels in victims of sudden cardiac or sudden unexpected death is lacking. Additionally, post-mortem studies have shown higher concentrations of remnant-like lipoprotein particles (RLP) in sudden cardiac death victims. Triglyceride to high-density lipoprotein cholesterol ratio (TG/HDL) is associated with RLP concentration, but has not been reported for victims prior to sudden death.

Hypothesis: We assessed the hypothesis that out-of-hospital sudden unexpected death (OHSUD) victims would have similar or higher calculated LDL levels and higher TG/HDL ratios when compared with National Health and Nutrition Examination Survey (NHANES) participants.

Methods: From 2013-15, all free living adults aged 18-64 who died out-of-hospital as reported by emergency medical services in Wake County, North Carolina (population 974,289) were adjudicated to identify OHSUD victims (n=408). Medical records were requested from area healthcare providers; 138 victims had a lipid panel available at an average of 1.2 years prior to death. To emulate a similar follow-up period, 18-64 year old NHANES (2009-2010) participants with a lipid panel who were alive at the end of 2011 served as a comparison group (n=1316). Covariates were abstracted from medical records for OHSUD victims and self-reported in NHANES participants. Subjects with triglycerides >400 mg/dL were excluded for analysis pertaining to LDL. We used multiple linear regression to assess the difference in lipid measures between OHSUD victims and NHANES participants, adjusting for demographics, prevalent dyslipidemia, diabetes, hypertension, body mass index, and coronary artery disease, use of lipid-lowering medication and clinic visits per year.

Results: OHSUD victims had a lower mean LDL than NHANES participants (91.6 mg/dL; 95% CI 84.7, 98.5 vs. 115.8 mg/dL; 95%CI 113.8, 117.7 respectively). After multivariate adjustment, mean LDL of victims was still 22.3 mg/dL lower than NHANES participants (p<0.001). OHSUD victims had a higher unadjusted mean TG/HDL ratio than NHANES participants (4.2; 95% CI 3.2, 5.2 vs. 2.9; 95% CI 2.7, 3.2 respectively); this difference was mildly attenuated on adjustment for age, gender and race and insignificant upon additional adjustment for dyslipidemia and diabetes status.

Conclusion: Contrary to expectations, OHSUD victims had a more favorable LDL cholesterol profile unexplained by differences in demographics, comorbid conditions or use of lipid lowering medication. The elevated TG/HDL ratio in victims, though explained by a higher prevalence of comorbidities, corroborates an evolving hypothesis on the contributory nature of vasoactive, prothrombotic remnant-like lipoprotein particles to sudden unexpected death.