H151 A Comparison of Deaths From Diabetic and Alcoholic Ketoacidosis

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After attending this presentation, attendees will understand the patterns of death associated with diabetic and alcoholic ketoacidosis.

This presentation will impact the forensic science community by increasing the understanding of the similarities and differences between deaths due to diabetic and alcoholic ketoacidosis.

Ketoacidosis is an important cause of death encountered at autopsy. Ketoacidosis is most commonly recognized in diabetes mellitus, that is, Diabetic Ketoacidosis (DKA), which is a medical emergency. It may also be seen as a consequence of alcoholism — Alcoholic Ketoacidosis (AKA). Other causes of ketoacidosis include starvation and certain diets. The diagnosis of ketoacidosis is made at autopsy by the presence of ketone bodies (acetone, b-hydroxybutyrate, and acetoacetate). Diabetes mellitus can be identified by history, pathological features (diabetic nephropathy), and by measurement of vitreous glucose or hemoglobin A1C. Alcoholism is typically diagnosed by history and scene findings, which can be supplemented with pathological findings.

This study analyses a series of 151 deaths where ketoacidosis was given as the cause of death in a period from November 2009 to January 2014 in Toronto and Ottawa, Canada. There were a total of 9,332 autopsies, so ketoacidosis represented 1.6% of all deaths. Of these 151 deaths, 82 were reported as deaths due to DKA (0.9% of all deaths), 48 due to AKA (0.5% of all deaths), and 21 as ketoacidosis not otherwise defined or were both diabetics and alcoholics.

Of the 130 DKA and AKA deaths, four DKA deaths and nine AKA deaths were excluded because of insufficient data for analysis or because the principal cause of death was not DKA or AKA, but ketoacidosis was a contributing cause.

Of the 117 deaths, 71 were male and 46 female. The age range was 19-79 years with a mean age of 50.6 years and a median age of 51 years. In relation to the time of year, the deaths were recorded in three-month blocks: March-May=18.8%, June-August=23.9%, September-November=22.2%, and December-February=35%.

The Body Mass Index (BMI) was analyzed with a range of 11.3-52, mean 22.7, and median 21.2.

The main ketone body measured throughout the period of the study was blood acetone. The range varied from not detected to 138mg/100mL with a mean concentration of 28.04mg/100mL and a median of 22mg/100mL.

Of the 78 DKA deaths, 51 were male, 27 female. In 20 deaths, there was no prior history of diabetes mellitus (25.6%). Of the 39 AKA deaths, 20 were male, 19 were female. Comparing DKA and AKA and analyzing the data statistically using the Two-Sample T-Test, the mean age of DKA victims was 49 years, AKA 53.7 years (p=0.04), mean BMI in DKA victims was 23.0 and in AKA 22.2 (p=0.55). With respect to acetone concentrations, the mean concentration in DKA victims was 33.3mg/100mL and in AKA victims 17.8mg/100mL (p=0.001).

In conclusion, DKA is the most common cause of ketoacidosis at autopsy, representing nearly 1% of all deaths and was twice as common as AKA. In 25% of deaths from DKA, there was no prior history of diabetes mellitus. Deaths associated with ketoacidosis were most common between December and February. Victims of DKA and AKA had similar BMIs of 23.0 and 22.2. Mean acetone levels were significantly different between the two groups, being 33.3mg/100mL in DKA and 17.8mg/100mL in AKA victims.

Diabetic, Alcoholic, Ketoacidosis