



Anthropology Section - 2015

A63 Estimating the Postmortem Interval: A Validation Study of the Total Body Scoring Method Using Medicolegal Cases From Southeast Texas

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After attending this presentation, attendees will understand the limitations of applying the Total Body Scoring (TBS) method to time-since-death estimates in cases of temperature-regulated indoor decomposition in humid environments.

This presentation will impact the forensic science community in terms of performance by contributing to the existing anthropological literature on the utility and contribution of the TBS to time-since-death estimations.

Time-since-death estimation often falls under the purview of the forensic anthropologist, requiring an extensive analysis of the intrinsic and extrinsic factors that affect decomposition. Methods employed in the estimation of time-since-death must be rigorously tested to ensure they are accurate, reliable, and contribute meaningful information to the death investigation. A common practice used by forensic anthropologists is to estimate the Postmortem Interval (PMI) based on the gross presentation of the decedent. Following this practice, Megyesi and colleagues attempted to correlate various stages of decomposition with Accumulated Degree Days (ADD).¹ They developed a standardized scoring system for the progression of decomposition, termed TBS, and found a strong positive correlation between estimated ADD and TBS. A regression formula that allowed the methods to be applied to medicolegal cases was developed for this study.

The TBS is considered to be one of the most reliable methods for quantitatively estimating time-since-death; however, several recent validation studies in various climate zones have found that the TBS method failed to produce reliable estimates. These studies cite humidity as a factor that may explain the variation seen in individual rates of decomposition. As a subtropical region, southeastern Texas experiences high levels of humidity year round, making this particular variable an important component of the decomposition process. For this reason, independent validation of the method for the specific environment is needed. Based on previous studies, the initial expectation for this study was that the TBS would yield time-since-death estimates incongruent with known PMIs.

For the present study, the TBS was applied retrospectively to medicolegal cases in which the decedent was found in a temperature-regulated indoor environment and had a documented last-seen-alive date. The study included 95 deaths investigated by the Harris County Institute of Forensic Sciences in Houston, TX, from 2013 to 2014. All cases had known PMIs of less than one year and temperature data recorded from indoor thermostat devices. Additionally, ambient temperature was recorded during the scene investigation and, when it deviated from the thermostat temperature, the average of the two temperatures was recorded. A TBS was assigned to each case using scene and autopsy photographs. In each case, the TBS was input into the regression formula developed by Megyesi and colleagues to calculate the total number of ADD and the associated standard error. Known and estimated ADD and associated PMIs were compared quantitatively. Accuracy was measured by dividing the number of cases with known PMIs within the estimated PMI ranges by the total number of cases in the sample. Additionally, eight individuals independently scored six cases to measure potential inter-observer error.

Overall, this study did not support the TBS in cases of temperature-regulated indoor decomposition in southeast Texas. The TBS accurately estimated the PMIs of 89 (94%) decedents, but yielded results with low specificity. There was no significant difference between mean known and estimated ADD ($U=4111.00$, $p=0.289$); however, there was a significant but weak positive relationship between assigned TBS and known ADD ($r=0.4576$, $p<0.001$). Additionally, a fixed-factors analysis of variance indicated that inter-observer error was low ($F=0.397$, $df=7$, $p=0.903$). These results suggest that, in the context of this study, the TBS fails to estimate the PMI with enough resolution to provide meaningful information to medicolegal death investigators; however, it does provide a quantitative means for comparing stages of decomposition between decedents. Further investigation into the utility of the TBS in estimating time-since-death in indoor environments is recommended.

Reference:

1. Megyesi MS, Nawrocki SP, Haskell NH. Using accumulated degree-days to estimate the postmortem interval from decomposed human remains. *J Forensic Sci* 2005; 50(3):618-626.

Postmortem Interval, Total Body Scoring, Human Decomposition