A122 The Application of the Megyesi Method and Improved Total Body Scores (TBS) and Accumulated Degree Days (ADD) Equations to Pennsylvania, Ohio, and New York Cases

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After attending this presentation, attendees will better understand the applicability of the Megyesi method to other regions of the country, including Pennsylvania, Ohio, and New York. Attendees will also gain insight on the practicality and reliability of the Megyesi et al. method (Megyesi method hereafter) and the Moffat et al. method (Moffat method hereafter) for Postmortem Interval (PMI) estimation.[1,2]

This presentation will impact the forensic science community by demonstrating some current limitations of the Megyesi and Moffat methods, stimulating further research to refine and improve PMI estimation methods based on decomposition.

Techniques based on the Megyesi method have been criticized mainly for their allegedly limited applicability to regions different from that of the original sample. In this study, the methods presented in Megyesi et al. and Moffat et al. were applied to a set of forensic cases from the Northeast United States, with known PMIs, processed at Mercyhurst University.[1,2] Seventy-five cases from 1997 to 2016 were examined for this purpose, but only 10 fulfilled the strict criteria of the Megyesi method on context conditions, surroundings, and completeness of the remains. These were all outdoor ground surface deposits with all elements necessary to calculate the TBS according to the Megyesi method.[1] Megyesi TBS were calculated from scene recovery photographs and later recalculated using the Moffat method. Average daily temperatures to calculate the ADD were collected from records of the National Oceanic and Atmospheric Administration (NOAA) for the general area of each scene. Ninety-five percent confidence intervals for the ADDs were calculated based on the equations in each method and compared to establish which of the two methods rendered the closest estimate to the known PMI of each case.

In the areas under study, the Moffat method rendered only a slightly higher accuracy, although more precise (narrower) intervals than the Megyesi method. The Megyesi method incorrectly estimated the PMI in four cases, while the Moffat method estimated PMI incorrectly for three cases. The average error was 16 days for the Megyesi method. For the Moffat method, it increased to 78 days. The much higher error for the latter is mostly derived from a single outlier appearing when the TBS scale was recalculated according to the improved equations; however, after removal of this outlier, the average error of the Moffat method was still 28 days.[2]

These results suggest that, while perhaps providing higher accuracy, the Moffat method may be applicable to a narrower range of PMIs; narrower even than that represented in such a reduced sample as the one examined in this study. Deviations of the confidence intervals from the actual PMI appear to be less frequent in the Moffat method. When they occur, they appear to be potentially much wider than in the Megyesi method, with the narrower confidence intervals of the Moffat method providing only the illusion of precision. This indicates a need for further research, increasing sample sizes and the range of PMIs, and environments considered in future studies to improve TBS/ADD methods.

Reference(s):

1. Megyesi M.S., Nawrocki S.P., Haskell N.H. Using Accumulated Degree-Days to Estimate the Postmortem Interval From Decomposed Human Remains. *J Forensic Sci*. 2005:50(3):618-626
2. Moffatt C., Simmons T., Lynch-Aird J. An Improved Equation for TBS and ADD: Establishing a Reliable Postmortem Interval Framework for Casework and Experimental Studies. *J Forensic Sci*. 2016:61(51):S201–S207.

Megyesi Method, Forensic Taphonomy, Postmortem Interval

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