USE OF CLUSTER ANALYSIS IN ASSESSMENT OF GEOGRAPHICAL VARIATIONS IN EQUINE MOTOR NEURON DISEASE FREQUENCY

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While cluster analysis is commonly used in descriptive and etiologic studies of human conditions, applications of this technique are not widespread in the veterinary literature. In those situations where the etiology of a disease is not fully understood, it may be relevant to assess whether cases of disease tend to arise in a geographic area more frequently than could be expected by mere chance. When spatial clusters of cases are identified, investigators can concentrate their efforts on the analysis of a narrower set of potential risk factors. Furthermore, if the disease is rare, locating spatial clusters allows the investigator to more efficiently focus on regions of high risk.

Recently described equine motor neuron disease (EMND) is a rare neurological disorder of unknown etiology that has been reported in Europe, Canada, Japan and Brazil, but is most commonly seen in the northeast of the USA (Mohammed et al., 1993). Our objective was to evaluate if significant geographical clustering of EMND cases occurs in the USA. Identification of such clusters will allow us to conduct focused epidemiologic studies to determine the environmental and host factors associated with this disease.

Nowadays, several statistical procedures are available for recognition of spatial clustering of disease through the study of regional disease rate data. Some of these methods include measures of spatial autocorrelation, such as Moran's I and Geary's c among others. Moran's index of spatial autocorrelation (I) was used to assess clustering of EMND cases in the USA. The case series consisted of all 80 confirmed EMND horses identified in the USA over the 1985-1993 period. The horse population of the USA was divided into a total of 21 states or survey regions as defined by the 1987 survey of the American Horse Council, and the mean yearly incidence of EMND for the study period was estimated for each of these geographical units. The I statistic measures the covariation between the rates of disease in neighbouring regions, attaining a value of zero if data have random spatial distribution and approaching the extreme value of 1 (-1) with strong positive (negative) spatial autocorrelation. Moran's I was preferred over other indices because 1) it has been shown to have good statistical power (Walter, 1992) and 2), under the null hypothesis of random spatial pattern, this statistic follows a normal distribution when more than 20 geographic units are being considered in the analysis, and this allows for the use of approximate z tests of significance.

REFERENCES


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