Space-time clustering of childhood leukaemia cases in Karachi, Pakistan

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RESULTS

During the 89 month study period from 1 January 1995 to 30 May 2002, 142 cases of childhood leukaemia were diagnosed at two tertiary care hospitals in Karachi. The results of the Scan test showed that a maximum of seven cases of childhood leukaemia were diagnosed during the time window of one month period from 11 October 1999 to 10 November 1999, which was significantly ($p = 0.001$) more than the expected number of cases (1.6) predicted for one month period. Significant ($p < 0.001$) temporal clustering was also observed for time windows of two to six months. Spatial and temporal clustering of cases of childhood leukaemia was examined using the Knox test. As is evident from ratios of observed to expected number of case pairs within specified critical times and critical distances, there is a consistent tendency of clustering of childhood leukaemia cases within critical limits of 3–5 km and 30 days and 3–6 km and 60–120 days (fig 1). The most significant clustering occurred when critical time was 90 days and critical distance was 6 km. For 142 cases in this study, 10011 case pairs were available for analysis. Of these total case pairs, 244 case pairs occurred within these critical limits of one another. These 244 case pairs were significantly ($p = 0.02$) higher than 222 case pairs expected to occur within critical time-space separation, if the spatial and temporal distribution of cases of childhood leukaemia were independent.

DISCUSSION

The results of this analysis provided evidence that cases of childhood leukaemia tended to occur in close proximity to

Key points

- Significant space-time clusters of childhood leukaemia were recorded.
- Findings strengthen the notion that common infection of high virulence and low pathogenecity may be involved in the aetiology of childhood leukaemia.
Policy implications

In conjunction with cumulative evidence, this study shows that childhood leukaemia may be an infrequent response to infection of high virulence and low pathogenecity. Future research however, is needed to ascertain this contention.

each other in time and time and space with an excess of 22 pairs over the random expectation within 6 km and 90 days of each other. The space-time clustering has also been shown with regard to residence at diagnosis for 13 351 cases of childhood leukaemia diagnosed during 1980–89 in defined geographical regions in 17 other countries.6 The results of this study strengthen the notion that a common infection of high virulence and low pathogenecity may be involved in the aetiology of childhood leukaemia.

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