

# Seasonal Incidence of Insect Stings: Autumn 'Yellow Jacket Delirium'

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**BACKGROUND.** Insect stings are a common injury. One of the most important aspects of stings is prevention through patient awareness. Little is known, however, about when most stings occur. This study was designed to define the seasonal pattern of stings.

**METHODS.** A retrospective review of the sting activity at a large emergency department (over 40,000 visits annually) was conducted for a 5-year period from 1991 to 1996. The clinical/financial data system identified 449 sting victims during this period. The average rate of stings was calculated for each month of the year.

**RESULTS.** The 2 months with the highest sting rates were August and September. The monthly sting rates in late summer and autumn were significantly higher than for late spring and summer ( $P=.002$ ). Sting rates in other months were much lower.

**CONCLUSIONS.** This study suggests that the highest incidence of stings occurs in late summer and early autumn. This is when yellow jacket "delirium" occurs, in preparation for cold weather. If studies in other settings confirm this pattern, the information can be used in modifying behavior to prevent stings.

**KEY WORDS.** Bites and stings; dermatitis; insect bites and stings; venomous bites and stings; wasps; yellow jackets. (*J Fam Pract* 1996; 43:271-273)

Much has been written about insect bites and stings. Although avoidance of the offending insect and behavior modification are widely promoted as keys to prevention,<sup>1-4</sup> little has been written about when most stings occur. The warmer months of the year are generally recognized as the period of greatest risk, but no further refinement of this risk period could be found in the literature. Stings are often anecdotally associated with late spring, when stinging insects, or Hymenoptera, begin to appear in abundance and are highly visible; however, this may not be the time when most stings occur.

A search of the MEDLINE database from 1966 to 1995 identified only one related paper. Results of a study of wasp stings in Auckland, New Zealand, revealed an increased sting incidence in late summer that was attributed to a peak in the number of

wasps.<sup>5</sup> A text on the biology of insects reports that adults of the Vespidae family, which includes yellow jackets, have been reported as having the potential to be a "nuisance" in late summer.<sup>6</sup>

Yellow jackets display bizarre behaviors at the end of the season, such as aggressive, yet transient, attractions to people, cars, street curbs, and other objects that are usually neither potential sources of food or shelter nor agents of provocative behavior. These objects appear to be simply random targets of intense interest to yellow jackets. This "yellow jacket delirium" occurs in late summer and early autumn. This aggressive, intoxicated-like behavior suggests an increased risk of stings during this time of year, a hypothesis that prompted a review of our institution's emergency department activity for stings.

## METHODS

A review of the billing diagnosis codes for our urban academic medical center's emergency department was conducted. The hospital's clinical financial management system was queried for emergency department visits with the ICD-9 code for venomous bites and stings. The number of

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stings and total number of emergency department visits were determined for each month in the 5-year period for which data were available (May 1991 to April 1996).

Monthly sting rates were calculated by dividing the number of stings by the total number of emergency department visits. An overall mean rate was calculated for each month of the year by averaging the monthly rates in each of the 5 years of the study period. Rates are expressed as number of stings per 10,000 visits.

## RESULTS

A graph of the monthly rate of stings shows a peak of sting activity in August and September (Figure). The months in the period of late summer and early autumn (August, September, and October) were compared with those of late spring and early summer (May, June, and July) over the 5-year period. The mean monthly sting rates per 10,000 emergency department visits during the two periods were 59 and 20, respectively. A *t* test indicated a statistically significant difference for monthly sting rates between these two periods ( $P=.002$ ). The remaining months of the year generally had much lower sting rates; of these months, November's rate was the highest.

The emergency department had an average of 3446 patient visits per month (range, 2933 to 3948) over the 5-year study period. The mean age of sting victims was 32.7 years. The distribution by age groups was as follows: 31% < 20 years old; 34%, age 20 to 39; 21%, age 40 to 59; and 14%, age  $\geq 60$ .

## DISCUSSION

Forty years ago, Garland<sup>7</sup> pointed out the trend for people to do more "outdoor living" and gardening, and its possible association with the rising number of reactions to insect stings. This trend continues to evolve today, particularly with the growing popularity

of outdoor fitness programs and sports. People should be aware of how to reduce the associated risks, or "perils of the patio" described by Garland.

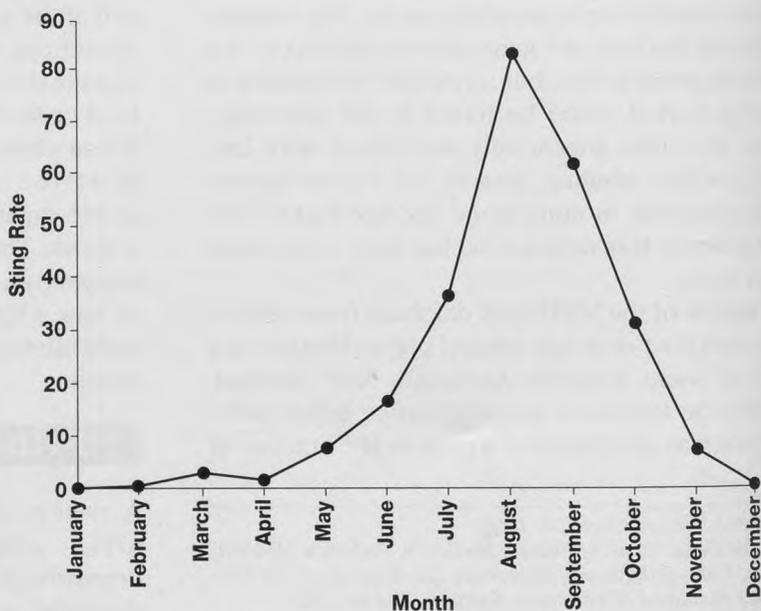
This examination of emergency department data lends preliminary support to the hypothesis that there is an increased incidence of stings in late summer and autumn. The greatest number of stings occurred in August and September. Surprisingly, the sting rate in November was the same as that for May.

It is unclear whether there is a cause-and-effect relation or merely a coincidental association between the peak in sting rates and the change in yellow jacket behavior at this time of year. Yellow jackets have been identified as the principal cause of allergic reactions to insect stings in most parts of the United States,<sup>1</sup> and Reisman<sup>8</sup> reports that the most frequent cause of venomous stings is the yellow jacket. No studies were found in the literature search, however, to support these claims.

It is seldom easy to determine the specific insect responsible for a sting,<sup>2,4,7</sup> although the stings or bites of some insects are associated with specific

FIGURE

Monthly rates of venomous bites and stings. Rates represent the number of insect bites and stings per 10,000 emergency department visits.



lesions that aid diagnosis. For example, a sterile pustule is associated with the fire ant, and necrosis results from the bite of a brown recluse spider.<sup>2,8,9</sup> Yellow jacket stings have no such distinctive features, however, and it is difficult to attribute an unwitnessed sting to a yellow jacket with any degree of certainty.

There are limitations to this study. The findings would be strengthened if supported by data from more than one institution or location. This study was set in Philadelphia, which experiences four very distinct seasons. Differing climates may have different sting patterns. Variations in sting patterns may occur in different regions because of fluctuations in weather and differences in insect populations. Since not all people with insect stings present to the emergency department, this study sample may not accurately represent the total population of sting victims. In addition, since the actual number of people at risk for stings is unknown, the total number of emergency department visits was used as a substitute in calculating the sting rate. The monthly pattern of stings using absolute number of stings was the same as the pattern using this ersatz rate of stings.

Administrative data from a large emergency department provided a relatively large and broad-based population sample. This study sampled over 206,000 total emergency department visits, and the age distribution of sting victims indicates a broad representation of age groups. Our use of administrative data may have affected the results, however, because of possible inaccurate coding, clerical errors, lack of detail, and intrinsic information system errors. The potential limitations of using administrative data have been discussed extensively elsewhere.<sup>10</sup>

The scientific literature provided no clear explanation for either the finding of peak sting incidence in the late summer and early autumn, or the observation of seasonal aggressive yellow jacket behavior. It is possible that the decreasing daylight and falling temperatures during this time of the year stimulate a surge of activity to hasten preparations

for the oncoming winter. Other factors may be the physical maturity of the insects or the growth in size of the colonies throughout the summer.<sup>7</sup> Decreased vigilance at this time of year also may contribute to the increased incidence of stings.

Everyone participating in outdoor activities and sports, particularly patients with a history of severe reactions to stings, should be aware of this somewhat counterintuitive timing of peak sting activity and maintain appropriate vigilance. The advent of autumn should not lull people into a false sense of security through the belief that the "perils of the patio," particularly stings, have diminished.

This study suggests that late summer and early autumn may be the most important period of the year for being vigilant about stinging insects. Since stings may present as nonspecific bites and rashes, clinicians should always consider the timing of peak sting activity in formulating differential diagnoses and prescribing treatments at this time of year.

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